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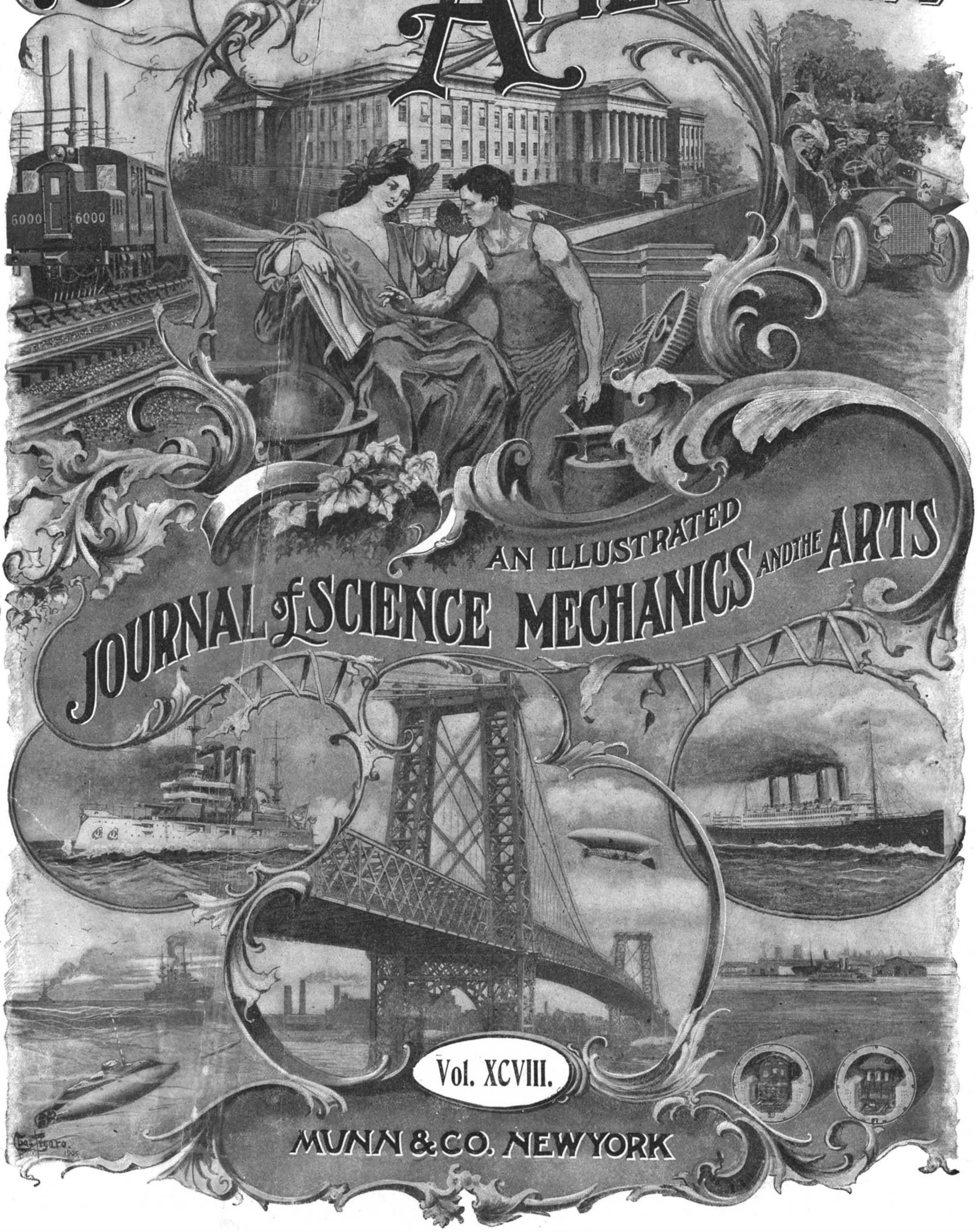

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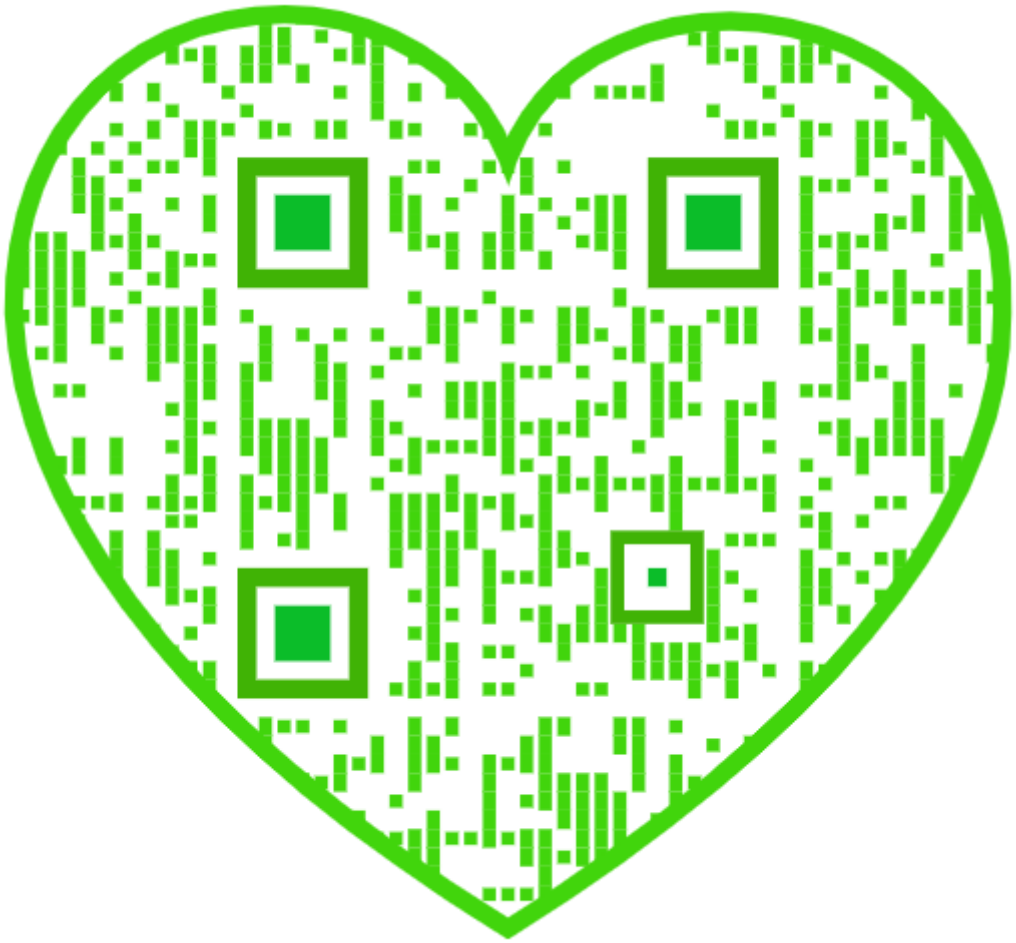

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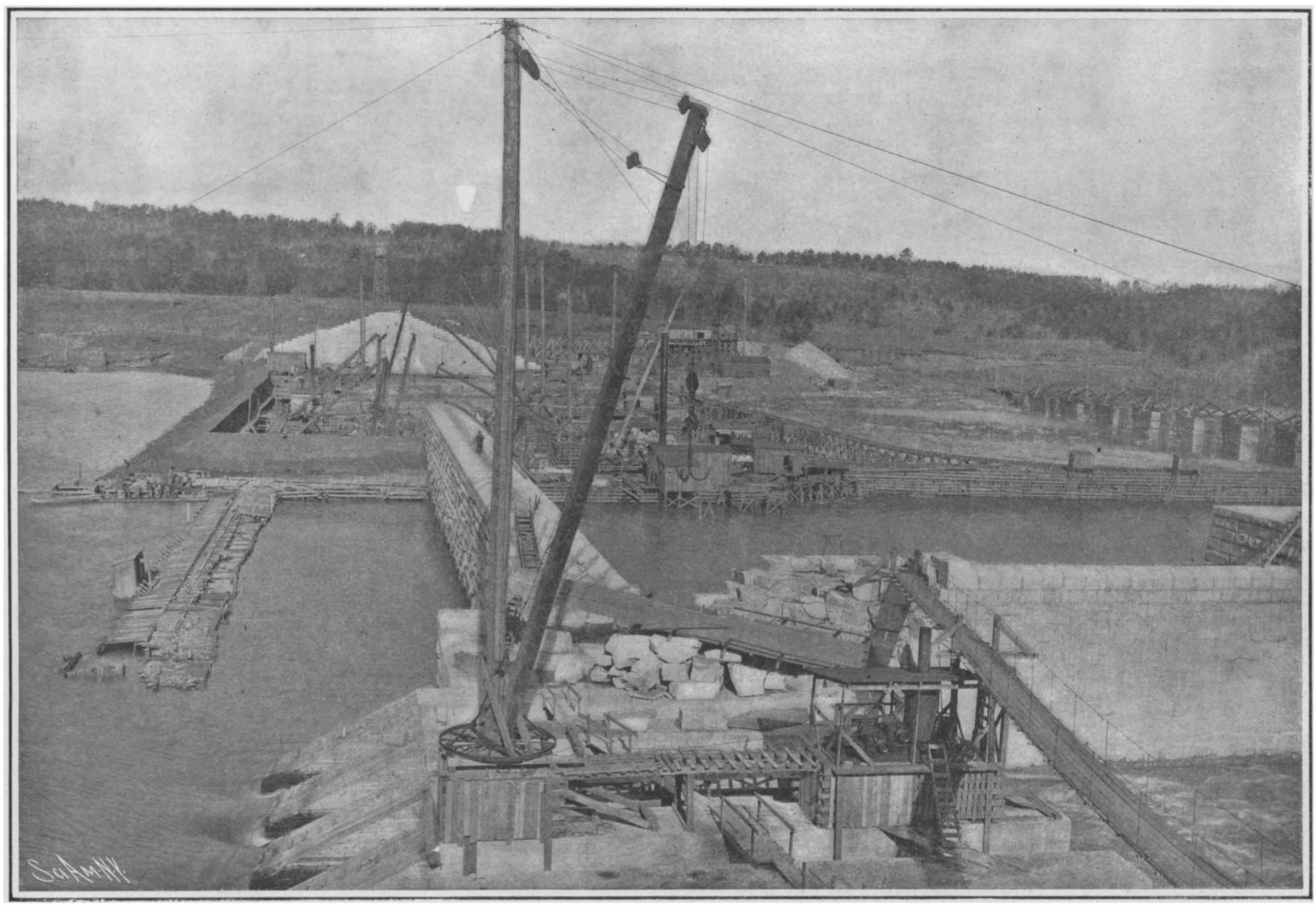
The Coffer Dam and Commencement of the Permanent Work.



The Dam Nearing Completion.

A NORTH CAROLINA POWER DAM.—[See page 6.]

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NEW YORK, SATURDAY, JANUARY 4, 1908.

The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

RETROSPECT OF THE YEAR 1907.

Industrial Conditions.

In any review of the year which has just closed, the fact which looms largest in the eye is the remarkable panic which the country sustained with an encouraging show of stability. The financial disturbance has been distinguished from previous panics by many marked contrasts; notable among which is the fact that it came at a time when the industrial activity of the country was at its height, and the volume of trade had reached a point beyond the wildest dreams, even of those who had foreseen the inevitable expansion of this country in population, wealth, and influence. Among the many causes assigned for the trouble, perhaps the most reasonable is that the amount of currency is not equal to the enormous amount of business which is being done, a theory which is supported by the fact that such a large percentage of the establishments and institutions which have suspended, or have gone into the hands of a receiver, have been found to have assets considerably in excess of their liabilities. There has been the usual lack of confidence; but, in the present case, it is entirely unwarranted by the actual conditions. For at this very time, not a few large concerns are extending, or contemplating an extension of, their business and properties; the rate of interest is being raised by the savings banks, and the announcement has recently come from the West that several of the banks are trying to find satisfactory apologies for the fact that their reserves are two or three times as large as the law requires. The number of commercial failures, never at any time as great as was popularly supposed, is steadily growing less; and several of the large industrial concerns are straightening out their affairs with a rapidity which proves that their temporary embarrassments were due more to panic than to actual pecuniary insolvency. As a matter of fact, the trouble may be traced to a comparatively small group of unprincipled speculators, of the kind that breeds so fast during times of great commercial prosperity, whose inevitable exposure and downfall—too long delayed—started the recent era of disquietude and lack of confidence. We firmly believe that the country, during the next few months, will enter upon a renewed era of prosperity. The lessons of the past few months have been laid to heart, and the future will, undoubtedly, be marked by a greater conservatism, and a universally higher standard of business morality.

Civil Engineering.

PANAMA CANAL.—Unquestionably, the greatest single engineering work of the day is the construction of the Panama canal. Not alone America, but the whole world, is watching the progress of this great undertaking with keen interest; and it is gratifying to realize that, at last, under the direction of our very able corps of army engineers, the work is being prosecuted at a rate which gives the best reasons to look for an opening of the canal at the specified time. The labor problem, once seemingly unsurmountable, has been satisfactorily solved; the men are well housed and fed; yellow fever has been wiped out; malaria is under control; and the general health conditions are comparable to those of any section of our own Southern States. The general plan of construction has been finally approved; the working forces are thoroughly organized, and the rate of progress has already exceeded the most sanguine expectations. The American steam shovel is doing splendid work in the Culebra cut, where the rate of excavation has risen to 1,868,729 cubic yards per month, which is over 200,000 yards more than the maximum amount moved in any one month during the construction of the Chicago canal. Extensive borings have shown that there are good foundations for the Gatun locks; and work upon the construction both of these and the adjoining Gatun dam is being actively prosecuted. Of scarcely, if any, less importance to the interests of this country, is the vast scheme for the improvement of our internal waterways, outlined in the recent report of the President's Waterways Commission, which, if it be carried through, will provide a system of canals and deepened channels from the Lakes to the Gulf, and will open up that frequently-discussed system of interior canals, by which sheltered waterway communication can be had from the Gulf to the southern Atlantic States, and through these States to a connection with the harbors and cities of the north Atlantic.

MUNICIPAL PUBLIC WORKS.—It may surprise some of the readers of this review to learn that during the past year, in New York city alone, there have been under construction public works of magnitude, whose aggregate cost will be three times the total estimated cost of the Panama canal. Chief among these are the improvements of the terminal facilities of the Pennsylvania and the New York Central Railroads. Each terminal station involves the excavation of some 2,000,000 cubic yards of rock. The Pennsylvania excavation is nearly completed; that of the New York Central is about one-third completed. The two tunnels for connecting the Pennsylvania tracks in New Jersey with the Manhattan terminal have been driven, and the work of concreting and finishing is under way. There yet remains the important work of sinking the supporting piles from the base of the tubes to firm foundations below the river bed. We believe it has not yet been decided whether these will be sunk by the jet or by the screw-pile method. Another important work of tunneling is that which is being pushed to completion by the Hudson Companies, whose scheme embraces four separate tubes, two at Morton Street and two at Cortlandt Street, connecting with a system of tunnels parallel with the foreshore of New Jersey and extending up Sixth Avenue in Manhattan to Thirty-third Street. Early in the present year a portion of these tunnels will be put into active service. After an extremely annoying series of accidents and hindrances of a more or less serious character, the twin tubes of the Rapid Transit Subway extending from the Battery, Manhattan, below the East River to the Brooklyn side, are at last on the eve of completion. For several hundred feet of the distance below the river, these tubes had to pass through a treacherous formation of a semi-fluid character, in which it proved very difficult to keep the tubes to the true grade. During the year repairs have been made for the purpose of correcting the inequalities of grade; and as a precaution against future settlement, iron piles were sunk by the jet method to firm bottom wherever the tubes have been driven in poor material. The existing Rapid Transit Subways continue to prove an unqualified success. Designed for a maximum capacity of 500,000 a day, the system is being so admirably operated that, on one or two occasions, it has carried as high as 700,000 a day. The construction of future subways has been rendered rather dubious, at least for the time being, by the failure either of the present Subway operating company, or of any other strong company, to put in a bid for the new subways approved by the late Rapid Transit Commission. The new Utilities Board, however, has authorized the construction of the Fourth Avenue Subway in Brooklyn; and with the return of better times, it is hoped that the city will see its way to starting work on at least one or other of the badly needed north-and-south systems in Manhattan and the Bronx.

The most important water supply scheme in the world was inaugurated during the year by Mayor McClellan, when he dug the first sod of the new Catskill water supply aqueduct, which is designed to bring a pure supply of mountain water to New York city. The plan includes the building of a system of connected reservoirs in the Catskill Mountains, and the construction of an aqueduct 90 miles in length, capable of supplying 500 million gallons of water per day to New York. The contract for the great Ashokan dam has been let, and ground is being broken along the route of the aqueduct. In this connection mention should be made of the successful completion of the apron at the foot of the Assouan dam, whose construction was necessary to prevent the undermining of the structure by the impact of the water from the sluices. The Egyptian government has authorized the raising of the level of the dam by 22 feet, an addition which will increase the amount of impounded water two and a quarter times, and will bring an additional million acres of land under irrigation.

Under the head of municipal improvements should be included some reference to the extraordinarily lofty tower buildings which have been under construction during the year in New York city. One of these, standing on a base only 60 feet square, has been carried to a height above street level of 612 feet; and although it has already been subjected to severe gales, the structure shows scarcely any perceptible vibration. Another tower building which has now reached about half its full height will have a total height of 658 feet above the sidewalk, and its topmost office floor will be 526 feet above the same level. Yet another building, extraordinary both for its height and great floor capacity, which has been built to a height of 480 feet, contains in its thirty-three stories a total floor space of 500,000 square feet, this last-named being the largest single building in the world.

BRIDGES.—The year 1907 will ever be notable in the annals of bridge engineering, if for no other reason than that of having witnessed the tragic fall of what was to have been the world's greatest bridge—that across the St. Lawrence River at Quebec. The structure was nearly one-half completed when it suddenly collapsed, and the whole 18,000 tons of the completed cantilever sank into the St. Lawrence River, causing the death of between seventy and eighty men. The evidence which has thus far transpired indicates that the failure was due rather to faulty design than poor workmanship. The immediate point of failure was the bottom chord, a huge compression member made up of four webs very flimsily latticed together at their edges. The chord failed because of the giving way of this latticing, which allowed the webs to crumple up like so many sheets of paper under the enormous thrust of the load. Moreover, the working stress employed in designing the bridge was altogether too high, or to put it another way, a perilously small factor of safety was used. This catastrophe will have at least one good effect in directing attention to the inherent weakness of the rectangular, built-up, latticed compression member, when it is employed in bridges of the greatest magnitude. For such bridges compression members should have continuous cover plates over the outer edges of the webs, and one or more continuous longitudinal diaphragms between the webs, associated with transverse diaphragms at stated intervals throughout the length of the member. Work on the Blackwell's Island bridge across the East River has progressed to a point which makes it probable that it will be opened some time during the coming year. The Manhattan Suspension bridge is moving forward slowly. The anchorages are practically completed, and the main towers have been carried up to about one-half their full height. This will be one of the largest suspension bridges in the world, with a span of 1,470 feet and a capacity of eight railroad tracks. Another monumental bridge, which was authorized during the year, is the 1,000-foot, four-track steel-arch bridge which will span the East River, and serve as a connecting railway between the New Haven and Pennsylvania Railroad systems. A work of tunneling which has attracted wide attention is that which is being done below the Detroit River, where a two-track tunnel is being built by an improvement of the method first used in constructing the Harlem River subway tunnel. The work consists in dredging a trench in the bed of the river, laying a pair of steel tubes therein, and burying the whole in a continuous mass of concrete. The English Channel tunnel scheme, after a strenuous advocacy by interested capitalists, has at length been indefinitely postponed on account of the opposition of the British government.

Naval and Military.

In the sailing of the Pacific fleet in the closing days of the year, there was witnessed the most spectacular, and, in its possibilities, the most serious event in the history of our navy since the Spanish war. We believe the dispatch of this fleet was prompted primarily by the desire to increase its efficiency and give to the officers and men that experience which can be gained only in an extended deep-sea voyage of this character. Whether the venture was suggested, in part, by considerations of a political character is known only to the Executive and to his immediate advisers, but, fortunately, in spite of the reprehensible attempt of one or two New York papers to give the movement of the fleet a sinister aspect, the good sense of the people of the United States and Japan, and the undoubted feeling of friendship which exists between them, have stripped the incident of that menace to the peace of the world which at one time it seemed fated to carry. The close of the year has witnessed also the culmination of a long series of bitter and concerted attacks on the material and administration of our navy, in a magazine article which has obtained a prominence altogether out of proportion to its credibility and value. No sane American can be brought to believe that the fleet that is now on its way to the Pacific is a collection of crudely-designed and indifferently-built ships, manned by officers who have outlived their usefulness, and are as little qualified to command these vessels as our naval designers were to plan them. We speak with calm conviction, based

upon an intimate knowledge and study of our modern navy, when we say that the suggestion is simply preposterous. The article in question is the latest and most daring example of the pitiful degeneration which has taken place in our magazine literature of late years, due to the desire to give to the public something spicily palatable rather than fundamentally true. Semi-submerged armor belts and insufficient freeboard will be found to be just as common among foreign navies as they are in our own, provided those ships be compared, which is the only honest way, that were designed at the same date. And it will be found that our own ships have the unquestionable advantage of being, ship for ship and date for date, very much more heavily armed. At the same time, it cannot be denied that some of the criticisms in the magazine article referred to, are fatally true. The blunder of building open ammunition hoists to the large guns of our earlier ships was regrettable; and the stubborn persistence in that blunder, in the face of continual disaster, was absolutely inexcusable. We believe that altogether some seventy-five men have been lost in the various turret disasters; and the majority of these fatalities are directly chargeable to open ammunition hoists. Furthermore, there can be little doubt that our present bureau system is cumbersome, inefficient, and provocative of a great deal of unseemly bickering among the bureau chiefs, and that many of the faults in warship design are directly traceable to this system.

Progress in the building of our navy has been very encouraging. The addition of a large number of battleships and armored cruisers to our effective list has brought our navy up to the second position among the navies of the world. There is, indeed, no navy in which so large a proportion of the total displacement consists of fighting ships of the first class. It was a wise prevision which led our Navy Department to cease building unarmored vessels, and expend its appropriations upon ships that can fight in the line. In this respect we have anticipated by several years the main feature of the policy which is now being universally adopted. That policy includes the building of big, one-gun battleships; fast unarmored scouts of 3,000 or 4,000 tons displacement; destroyers of sufficient size and power to keep the sea in all weather; and submarines. We are sadly behind the other nations in the number and quality of our destroyers, and Congress should see to it that liberal appropriations are made for these vessels. During the year contracts have been let for two 20,000-ton battleships, which will be fully the equal of any of their class building abroad. We are not constructing any more armored cruisers; that type of ship having at last merged into the battleship. We are proceeding cautiously in the matter of installing turbines in our warships. The Curtis and the Parsons types have been placed in two of our fast scouts, and one of the 20,000-ton battleships is to be driven by Curtis turbines. Our Bureau of Steam Engineering is not yet satisfied that the turbine has shown any decided superiority for the propulsion of warships of large displacement. The progress of foreign navies has been, without exception, in the direction of building large ships, mounting not more than one or two calibers of big guns. Great Britain is building six improved "Dreadnoughts;" France, six 18,400-ton battleships armed with four 12's and twelve 9.4's; Germany, four 19,000-ton ships carrying sixteen 11-inch guns; and Japan, two 18,800-ton ships carrying four 12's and twelve 10's, and two 21,000-ton ships mounting twelve 12's. Some astonishing records were made toward the close of the year by the new British 800-ton destroyers, which have made speeds on trial of from 34 to 36 knots. In both the army and navy there has been a remarkable development in the accuracy shown at target practice; and it is doubtful if any nation can offer better results than have been obtained in both arms of our service during the last six months of the year.

Aeronautics.

The past year has been one of great activity in aeronautics; in no previous year has so much been either attempted or accomplished. The simple balloon, in spite of its inherent limitations, continues to grow in popularity; and now that its safety and certainty of control have been established it is taking hold of the popular imagination, and is becoming established as a recognized form of sport. The Parisians, as usual, are foremost in this movement, and balloon pleasure trips became, during the past summer, a regular means of diversion. Several successful balloon contests were held on the Continent, and in this country the international race for the Gordon-Bennett cup, which was won last year by Lieut. Lahm, was successfully carried through by the Aero Clubs of America and St. Louis. There were six foreign contestants—three from Germany, two from France, and one from England—and for the defense three American balloons were entered. The start was made from St. Louis at 4 o'clock in the afternoon of October 21, 1907, by the German balloon "Pommern," under the command of Oscar Erbsloeh, and on October 23, early in the day, it descended at Asbury Park, N. J., a winner over the second balloon, "L'Isle de France," by a distance of three miles, having covered altogether 876¾ miles. The excellent gas-holding qualities of the modern balloon are shown by the fact that "L'Isle de France" was in the air continuously for 44 hours and 2 minutes. The best work of the year undoubtedly has been done with the dirigible type; and the most successful flights have been those made by Count Zeppelin. Zeppelin's machine is the largest dirigible in the world. It is 40 feet in diameter by 420 feet in length, and carries two engines of 80 horse-power, each of which drives twin propellers. It has remained continuously in the air for seven hours, and has made a flight of 220 miles at a speed of over 30 miles an hour. Zeppelin's machine has been purchased by the German government, and he is now at work on one that will be larger and more powerful, and embody the improvements suggested by the experimental work of the past summer. Until the loss of "La Patrie," the French government possessed two dirigibles, with one other, the "Republic," under construction; but during the preparations for a recent flight and in a strong wind, the "Patrie" was torn loose from the soldiers who were holding it, driven across to Ireland, and afterward out to sea. The "Nulli Secundus," the first really practical airship of the British army, was also recently wrecked in the same way, being torn loose from its anchorages and badly wrecked. These two disasters indicate just where the dirigible is most vulnerable; for it has long been recognized by those who are experimenting in ballooning, that in spite of the creditable work which has been done with these machines, they must, because of their large area and necessarily light construction, be completely at the mercy of a gale of wind.

Here in America an effort has been made to stimulate aerial navigation, by the offer of the SCIENTIFIC AMERICAN $2,500 trophy for heavier-than-air flying machines. Although the offer was made early in 1907, there were no successful competitors, which may be taken as evidence that the difficulties in the way of the production of a successful machine are well understood by the practical aeronaut. Just before Christmas, the United States army called for bids for a practical machine of this type, and offered some attractive inducements, which would have been more likely to encourage inventors had they not been hampered by the very severe terms of the contract, and notably by the one requiring on the part of each bidder a deposit of ten per cent of the cost of the machine, this last being to our thinking a stipulation which will be simply fatal to the whole scheme. Successful results with the heavier-than-air machines or aeroplanes have been confined chiefly to France, where Farman has made a flight in a closed circuit of nearly half a mile, coming successfully back to the starting point; and where Bleriot, using a machine of the Langley type, has also done some commendable work. The Wright brothers seem to have been too busy endeavoring to sell their invention to foreign governments to find time for any practical work with their aeroplane.

Steam and Electric Railroads.

ELECTRIC TRACTION.—The past year has been fruitful in its yield of valuable information as to the respective merits of steam and electrical traction on steam railroads. The first electric zone of the New York Central lines, reaching from Forty-second Street to High Bridge, has now for over twelve months been operated exclusively by electric locomotives, using direct current; and the New Haven system has been in partial operation from Forty-second Street to Stamford, a distance of 35 miles, by electrical locomotives making use both of the direct and single-phase current. These two are unquestionably the most important developments in the electrification of trunk steam railroads in the world, both being four-track systems carrying heavy traffic. The New York Central venture has proved to be a brilliant success. With the exception of the Woodlawn accident, which was chargeable to incompetent and careless operation rather than to the electrical equipment, the whole of this elaborate plan has been operated practically without any mishap, and the new locomotives have taken their trains in and out with a smoothness and reliability which exceed even that of the time-honored steam locomotives which they displaced. Moreover, a recent tabulation of the costs of this electric operation shows a decided economy over the former steam traction; and there is the added advantage that the number of train movements in the yard has been reduced from 1,200 to less than 700—to say nothing of the abolition of the nuisances of smoke and noise. Of the results on the single-phase system of the New Haven road it is, perhaps, too early to speak with certainty; but, judging from appearances, it would certainly seem that the installation has not proved nearly so reliable as the direct-current system of the New York Central Road, with which comparison will naturally be instituted. Judging from the continual presence of repair trains and the large number of interruptions due to temporary failure of the trolley lines, it would seem as though the complicated overhead system employed was not sufficiently robust to stand the strain of the heavy traffic of a four-track main line road. Moreover, although the overhead work has been completed as far as Stamford for many months, the company seem reluctant to trust the hauling of their through express trains to the electric system. It is sincerely to be hoped that this very meritorious attempt to utilize the single-phase system on a great railroad will meet with the ultimate success which it merits. During the year two other important applications of electric traction to steam railroads have been made. One of these was on a 44-mile stretch of the West Shore Railroad from Utica to Syracuse, on which the low-pressure direct-current was used, with third-rail distribution. In making the preliminary estimates, it was found that cost of an overhead line and motor equipment for the single-phase system would be about as great as that of a direct system with sub-stations. During the summer, also, a 34-mile stretch of the Rochester division of the Erie Railroad was placed in electric operation. In this case use was made of a single-phase system of the same general character as that used on the New Haven Road, current being transmitted at 60,000 volts, and a working pressure of 11,000 volts being used in the trolley line. For some years the Southern Pacific electrical engineers have been studying the question of electrifying the Sacramento division of the Southern Pacific Railroad, which extends for a distance of 136 miles; and during the year Mr. Sprague, the father of the multiple-unit system of operation, and some of the leading electrical companies have been called in to decide upon the system which will be best suited to the conditions. As this is a mountain division, it will form by far the most important work of this kind ever attempted. Considerable preliminary work has been done by the Pennsylvania Railroad in its investigation to determine the best type of locomotive and general equipment for its New York terminal lines. Both direct-current and single-phase locomotives have been under test, and we are pleased to note that in one of the later designs the four-wheeled truck has been adopted, with a view to enable these heavy and rigid machines to take the curves more easily. We shall always believe that the rigid driving wheel base of the New York Central locomotives had something to do with the bursting open of the track which resulted in the Woodlawn derailment.

STEAM TRACTION.—There has been a steady advance in the size and power of steam locomotives during the past year, some of these having reached colossal proportions. The most notable passenger engine is a huge express locomotive built for the Pennsylvania Railroad, with cylinders 24 inches in diameter by 26 inches stroke; 4,322 square feet of heating surface, a tractive power of 15½ tons, and a total weight of 134½ tons. The drivers are 80 inches in diameter and six-coupled. It was designed for the work of handling in one train passenger trains which otherwise must be run in two sections. Equally remarkable is the increase in the size of freight locomotives. There was built by the American Locomotive Company for the Erie Railroad this year a freight locomotive of the Mallet type whose total weight is 205 tons. The engine is compound, with cylinders 25 and 39 inches diameter and 28 inches stroke. The total heating surface is 5,214 square feet, and the tractive effort varies from 35½ to 42 tons. The most notable movement, affecting the economics of the locomotive, has been the growing recognition of the value of superheat. In some cases results have been obtained from simple engines with superheat, that compare favorably with those obtained from compound locomotives. In one comparison made on a western road between a simple-cylinder, superheat locomotive and a compound locomotive of the same weight and general design, the efficiency was within five per cent of that of the compound; and the simple superheat engine not only required less repairs, but, because of the drying-out effect of the superheater, there was an entire absence of foaming of the particularly bad water used on that division. This vital question is being investigated by Prof. Goss, of Purdue University, under a special grant of $3,000 for four years from the Carnegie Institute. The gasoline motor car has been making steady progress, particularly under the fostering care of the Union Pacific Railroad. The latest type of these cars, as developed at the Omaha shops of this railroad, has 200 horse-power engines; can make 60 miles an hour on level track; and shows excellent qualities of acceleration and retardation. They are built of steel, with port-hole windows and rounded ends. Unquestionably, for the operation of fast and frequent service, this type has a great future before it. It is quite conceivable that, under certain conditions of service, it may prove to be the successful rival of the electric car.

(Continued on page 7.)

A NORTH CAROLINA POWER DAM.

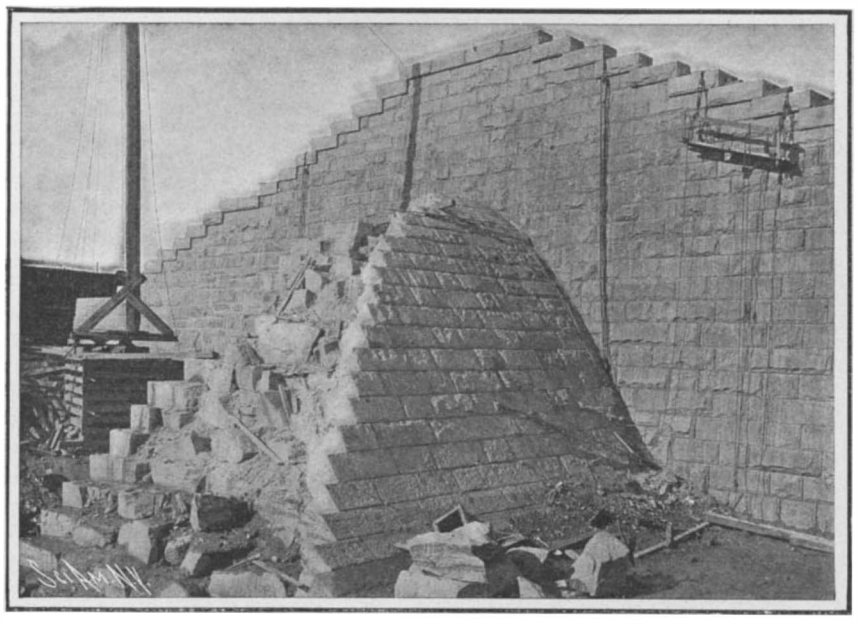
BY DAY ALLEN WILLEY.

A large electric generating plant is in course of construction on the Yadkin River near Whitney in North Carolina, at a point where the water has a considerable fall. There is a large demand for power in the neighborhood for operating local railways and lighting towns, and also for running the large cotton mills and other industries in the vicinity.

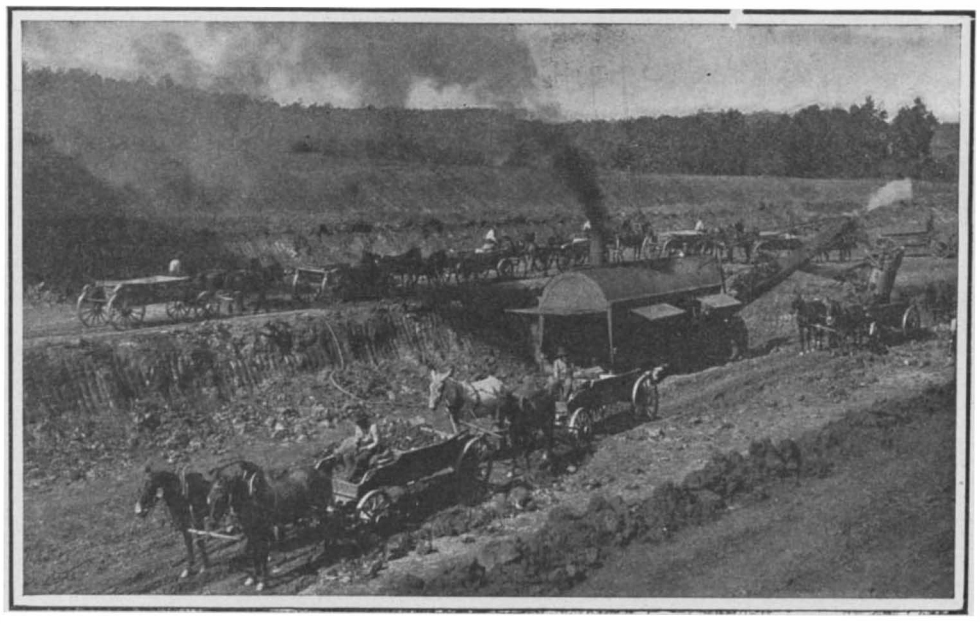
It is estimated that 100,000 electrical horse-power can be developed from the falls, but for the present about 50,000 horse-power will be secured, additional machinery being installed in the power house from time to time until the maximum horse-power is attained. To supply a sufficient head of water a dam is under construction 1,000 feet long, with an average height above the river bottom of 38 feet. Its width at the base is 58 feet, gradually narrowing at the crest to 12 feet. The design of the face of the dam downstream is ogee, the alignment being straight. The material is local granite, and it rests on bed-rock foundation. The structure is designed to withstand a flow of 200,000 cubic feet of water per second, equal to a depth of 15 feet above the crest of the dam. As a further protection against floods, however, a concrete core dam has been built for a distance of 300 feet on the east side of the river. Between the dam and the core is an abutment, which extends to a height of 20 feet above the crest of the main dam.

The granite spillway provided for protecting the power canal will have a maximum length of 1,500 feet and width of 38 feet. The canal serving the power station will be four and one-half miles in length, with a surface width of 112 feet and an average depth of water of 20 feet. Its capacity will permit a flow of 3,300 cubic feet per second, with a head available for the operation of the turbines of 129 feet.

The power house will be 80 feet in width by 300 feet in length. The first installation will consist of six units, each unit comprising one turbine water wheel developing 9,000 mechanical horse-power. The generators will be directly connected with the turbines, the revolving parts of each unit weighing no less than 70 tons, the distance from the bottom of the draft tubes to the top of the generators being 52 feet. The generators will deliver electrical energy at a rate of 11,000 volts. When transmitted to mills and other establishments not over forty miles distant, this will be raised to 30,000 volts by transformers, and if transmitted to points beyond forty miles, the pressure will be raised to 60,000 volts.



One of the Granite Abutments.



One of the Seven Steam Shovels Used in Digging the Canal.

The generators are capable of delivering 48,000 electrical horse-power continuously. Each generator carries its own exciter, and the switchboard is to be constructed so that any exciter can be used to excite any generator.

For the present the maximum distance which current will be transmitted is sixty miles, but when all the power is secured, the plant will serve a radius of one hundred miles. If demand arises, some 30,000 additional horse-power can be developed in the neighborhood.

The Yadkin has a fall of 129 feet in four and one-half miles; at the Narrows—where the plant is situated—it falls 90 feet in a little over a mile. It is estimated that in this territory there are now being used 100,000 horse-power developed by steam, at an annual cost of $4,000,000. The company expect to supply current as low as $25 per horse-power yearly at a profit; a saving effected to manufacturers of nearly forty per cent. The total cost of the dams, power canal, power house, and first installation of machinery is estimated to be about $9,000,000.

According to a dispatch from Copenhagen, Prof. Valdemar Poulsen, inventor of the undamped system of wireless communication, has notified the American Legation that he intends to establish a transatlantic wireless telephone service. Communication has been continuously maintained for two days between the experimental station at Lyngby, near Copenhagen, and the Weissensee station at Berlin, a distance of over 240 miles, the messages being clearly and accurately transmitted.

Death of Prof. Janssen.

Pierre Jules Cæsar Janssen, director of the Meudon Observatory, which he was instrumental in founding, died on the 23d of December.

He was born in Paris in 1824, and did his first work of importance in 1868 during the total eclipse of the sun in that year, making observations as to the causes of the sun's protuberances. A devotee to astronomy, he escaped from Paris in a balloon during the siege of 1870, so as not to miss the Algerian obscuration. He discovered a new method of quantitative spectrum analysis in the same year. In 1874 he watched the transit of Venus, in Japan. In 1875 he was placed in charge of the Meudon Observatory, noted for the work on the sun that has subsequently been done there, in which position he remained until his death.

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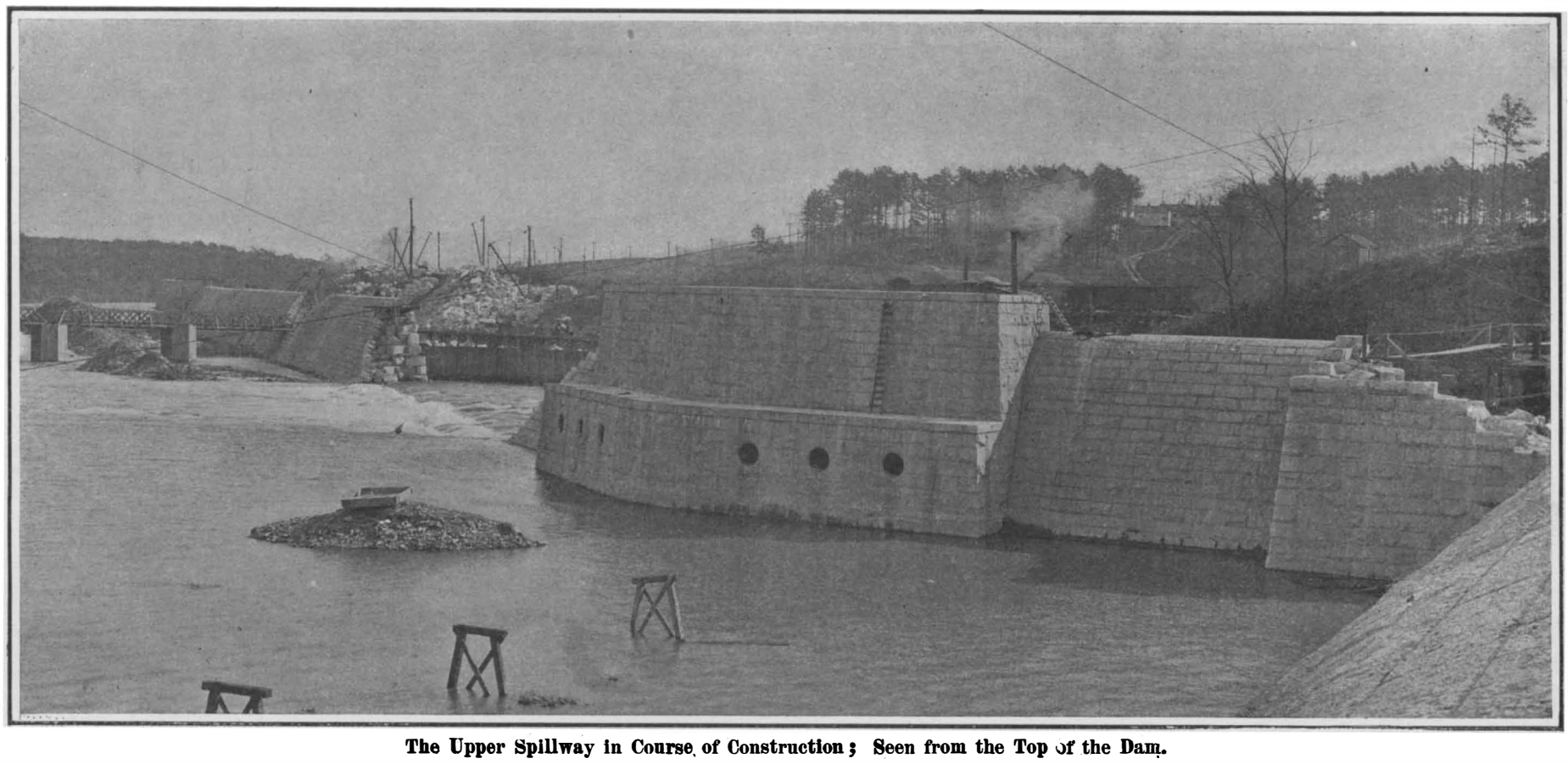


The Upper Spillway in Course of Construction; Seen from the Top of the Dam.

A NORTH CAROLINA POWER DAM.

SIGNAL LIGHTS FOR BREECHES BUOYS.

After having been in use for over a century without improvement or change, the breeches buoy used by organized life-saving crews has been improved by a device that has just been adopted by the United States life-saving service. The main difficulty with the breeches buoy as heretofore constructed has been that at night, when it left the shore, no one knew definitely where it was, whether it had reached the wrecked ship or not, or whether any one had gotten in, unless the mariners had lights on the vessel.

John W. Dalton, of Gloucester, known to mariners all along the Massachusetts coast, is the inventor of the devices which are known as "Dalton's auto-signal safety breeches buoy." The improvement in question comprises, speaking in general terms, a small case mounted on an inflated rubber cushion and surrounded by four small hollow posts which are affixed to the rubber cushion buoy and on top to a square steel spreader, as shown in the accompanying illustrations. In the case is a storage battery that operates a set of lamps. One light, a green one, shows toward the shipwreck when the device is started out to the vessel; the other light, a white one, shows down through the rubber cushion into the breeches, enabling the shipwrecked people to see how to get into the apparatus. Another white light shows toward the shore until the breeches buoy is occupied when it automatically turns to a bright red, going back to white again when the passenger is landed.

Under the old system, when the breeches-buoy was sent out to a wreck, it was often hauled back to the shore by the life-savers before it had reached its destination. Now the position of the breeches-buoy will always be known to those on shore and on the wreck. The green light moving toward the vessel mutely tells the shipwrecked passengers that help is at hand and encourages them to hold on until the buoy reaches them. As soon as one of the imperiled mariners gets into the breeches, the red light signals to those on land to haul the passenger ashore. Signaling is further provided for by a rocket discharged by the same method which shifts the lights in the buoy signal box.

The cartridge signal rocket, mentioned above, is placed in the chamber in the overhead cushion and is discharged in the air by the same action which shows the red light. This is hardly needed, however, as the lights operated by the storage batteries are very powerful and can be seen a long distance.

The rubber cushion prevents the occupant below from being injured by the block striking him while being dragged through the surf. Numbers of persons have been severely injured while being saved from a wreck by the big iron traveler block as the vessel lurched back and forth.

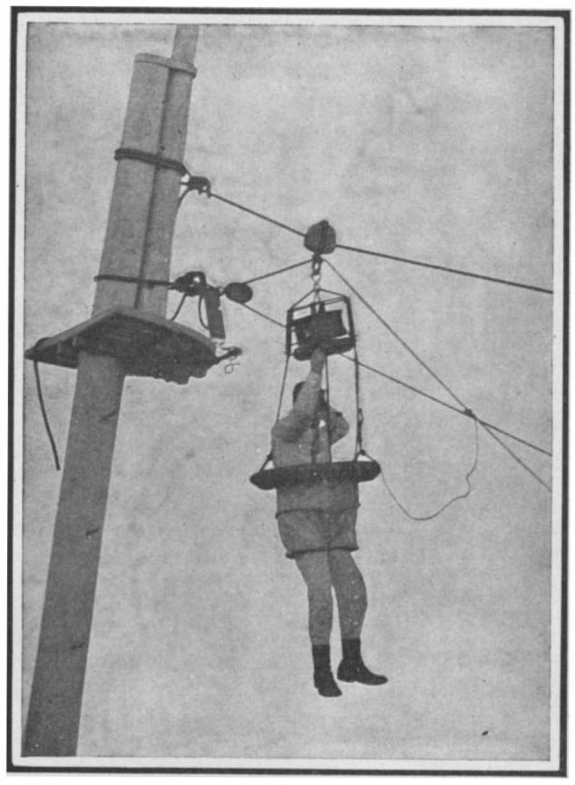
RETROSPECT OF THE YEAR 1907.

(*Continued from page* 5.)

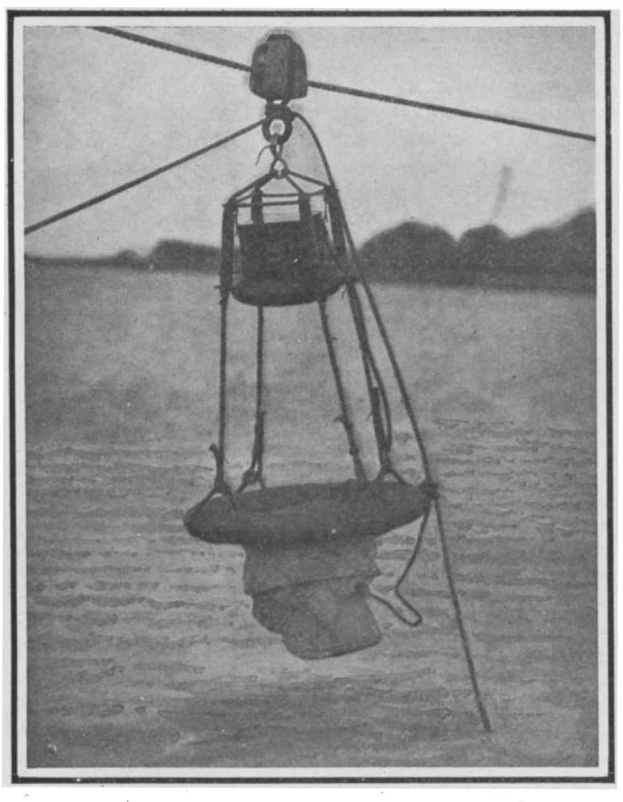
BROKEN RAILS.—An important event affecting the safety of railroad travel was the bringing to a crisis of the contention between the railroad engineers and the manufacturers as to the manufacture and properties of steel rails. The State Railroad Commission of the State of New York showed in a special report, that in the winter months of 1907, nearly three thousand broken rails were removed from the track in this State alone. This increase in breakages was shown to be due partly to exacting conditions imposed by heavier traffic, but far more to hasty and improper methods of manufacture, introduced in order to increase the output. As the result of the agitation, joint committees of the railroads and manufacturers have been at work during the year upon new specifications, shapes, and methods of manufacture; and it now looks as though the subject would be placed upon a sound basis and reliable rails properly safeguarded by specifications, would be assured. The new rail will have a better distribution of the metal, with less in the head, and more in the web and base, and the manufacturers have agreed to a larger percentage of crop from the ingot.

The Automobile and Motor Boat.

That the automobile has settled down to its approximate final type is suggested by the small and decreasing number of novelties which have made their appearance during the past year. And with this ultimate agreement upon a best type there has come a remarkable improvement in the quality of the product, both as to the material of construction, the reliability of operation, and the finish and general appearance. Wonderfully rapid has been the development of this most complicated machine to its present perfection. We may search in vain through the whole field of mechanical engineering to find a parallel, unless, indeed, it be in the scarcely less rapid development of the steam turbine. The composite type automobile at the close of the year 1907 has a pressed steel riveted frame; a 40-horse-power, 6 cylinder engine; magneto ignition, with the jump spark in reserve; it will be water-cooled, with its pump driven by gears from the engine shaft; it will have a three or four speed sliding gear of the selective type; a cone clutch, or if not that, one of the floating disk or ring type; and the car body will be distinguished by straight lines and a general simplicity and purity of outline and coloring. With reasonably careful handling and inspection, a car of this type, built by any of the first-class makers, affords as reliable a means of locomotion as exists to-day. Apart from its excellent record in the hands of the average user, the automobile has done some remarkable work during the year, in the field of racing, in long-distance competitive touring, and in various severe endurance trials. Although, for want of a suitable race course, there was no competition this year for the Vanderbilt cup, the usual quota of foreign races was pulled off successfully. The races on the Florida beach last spring did not compare in point of interest with those of preceding years. The only cars entering the contest were a few stock machines, and the Stanley steam racer which last year covered a mile in 28 1-5 seconds. The 5-mile open championship was won by a special Stanley racer at a speed of 80 miles an hour; the 10-mile race by a 70-horse-power



Making a Trip in the Improved Breeches Buoy.



The Small Rubber Cushion Supports a Battery and Signal Lamps.

SIGNAL LIGHTS FOR BREECHES BUOYS.

American Mercedes, at a speed of 77.8 miles an hour. This car also won the 100-mile race at an average speed of 69½ miles an hour. The Stanley racer failed to equal the record of last year by 2-5 of a second, and in the second attempt capsized and was completely wrecked. The accident marks the last appearance, let us hope, of the freak machine on this or any other automobile race track. The race over a 310-mile course for the Emperor of Germany's cup in Europe was won by Nazzaro on an Italian Fiat at a speed of 55.76 miles per hour. Perhaps the most important event in the field of automobile racing was the opening of the new cement track at Weybridge, England, an excellently designed and built, pear-shaped, race course, 100 feet wide and 3¼ miles in length. The most sensational performance on this track was that of Mr. S. F. Edge, who drove a car 1,581 miles in twenty-four hours at an average speed of over 65 miles an hour. Of long-distance road races that from Peking to Paris, over a distance of 7,500 miles, must long remain the most famous. It was won by Prince Borghese in a 40-horse-power Fiat against two De Dion 16-20-horse-power touring cars, a tri-car representing France, and a 24-horse-power Spyker touring car representing Holland. The winner carried two 60-gallon gasoline tanks. He used 16 shoes and 16 tubes. The start of the race took place from Peking on June 10th, and Paris was reached August 16th. Mention should here be made of the comparative test of alcohol, kerosene, and gasoline as automobile fuels, made early in the year. Three identical Maxwell touring cars made the run from New York to Boston; one using the new tax-free alcohol, and the others employing kerosene and gasoline, respectively. The main object of the test was to demonstrate that a modern gasoline car can be run on alcohol or kerosene successfully, and also to bring out the comparative cost of operating it on the three fuels. The total consumption of the three cars, gasoline, kerosene, and alcohol, for the 250-mile journey was respectively 24¾, 33¾, and 40¾ gallons, and the cost was respectively $4.95, $4.39, and $15.07. Very successful was the competition conducted by the Automobile Club of America known as the "Sealed Bonnet Contest," in which out of forty-seven cars that started, forty-two finished with a perfect score, and this over a course aggregating 600 miles in length. The fact that so many standard machines went through with a perfect score, that is to say, without any mishap whatever, should set at rest forever the popular fallacy that it costs as much to keep a car and run it for a season or two, as the original price of the car itself. The longest and most strenuous test of touring automobiles that has ever been held, either here or abroad, took place this year in connection with the touring contest for the Glidden and Hower trophies. In the course of the tour, which extended over 1,507 miles, the contestants met with bad weather and indescribably bad roads. Of the fifty-five cars which finally finished in New York city, no less than twenty-one machines competed with perfect scores, and among these were several small American machines of from 16 to 20 horse-power.

The trend of motor boat development during the year has been altogether in a healthy direction. We hear little and see less of the high-powered racing shell, which, like the craft built for the "America" cup contests, is capable of nothing more than a short burst of speed over a specified course in fair weather. The development has been almost entirely in the direction of staunch, seaworthy, moderate-powered cruisers, having comfortable cabin accommodations and capable of staying outside, if need be, or making their port of destination, in fairly rough weather. The sea-going capacities of these boats were shown in the race to Bermuda, when the 75-horse-power "Ailsa Craig" beat the 25-horse-power "Idaho" by 16 minutes and 22 seconds only. The winner made an average speed throughout the entire distance of 10.18 knots. The motor boat novelty of the year has been, of course, the hydroplane—a most interesting craft, of which several widely different types have been built and tried. Mention should be made of Cooper Hewitt's hydroplane, which consists of a light mahogany hull, suspended in a framework of steel tubing, below which is carried a series of hydroplanes disposed at different depths below the boat. As the speed of the engine is increased the boat rises, leaving the surface of the water at 16 miles an hour, and continuing to lift until a speed of over 30 miles an hour is obtained. It is the inventor's belief that he has at times reached a speed of over 35 miles an hour. His future experimental work along these lines will be watched with much interest. The limits of the present review prevent much detailed reference to the various hydroplane boats which have been built here and abroad; but mention should be made of the hydroplane boat of Count de Lambert which consists of a catamaran mounted on five planes, for which Count de Lambert claims a speed of 34 miles an hour; and of the freak motor boat of Levavasseur, made up of a short boat containing the engine, and a long attached tail for carrying the propellers and the rudder. The "Ricochet Nautilus," a diminutive craft 11 feet long carrying a 10-horse-power motor, is claimed to have a speed of 30 miles an hour. A curious novelty in high-speed boats is a French creation called the typhonoid, which is driven by a six-bladed propeller, that terminates in a cylindrical tube, carried below and extending the full length of the keel. The hydroplane of Crocco and Ricaldoni driven by air propellers, rises as the speed increases upon two V-shaped fins at bow and stern, and the usual promises are made of phenomenal speeds. It may be said once for all regarding the hydroplane

type that its use will be restricted to smooth water and that, therefore, it can never have any considerable commercial value.

Merchant Marine.

The growth in the speed and sumptuous arrangement of the ocean liner goes on apace. The year 1907 saw the arrival in this port of the four largest steamships that have ever been constructed. The first of these was the "Adriatic" of the White Star line, one of the increasingly popular freight and passenger ships of great size and moderate beam. She is 725 feet long, 75 feet broad, 50 feet deep, of 40,000 tons displacement, and 17 knots speed. She was followed three months later by the "Cecilie" of the North German Lloyd line, an exact duplicate of that famous liner the "Kaiser Wilhelm II." The "Cecilie" is 706 feet long, 72 feet in beam, 44 feet 2 inches in depth, 32,000 tons displacement, and of 23½ knots speed Then came the two Cunarders, the "Lusitania" and "Mauretania," in which the length went up to 790 feet, the beam to 88 feet, the depth to 60 feet in the case of the "Lusitania" and 60 feet 6 inches in the "Mauretania," the displacement to 45,000 tons, and the contract speed to 24¾ knots. The highest ocean speed for the whole trip yet made by either of these ships is 24.25 knots, which was the average of the "Lusitania." This is half a knot less than the average speed which must be shown throughout a whole round voyage from Liverpool to New York and back by each of these ships before they can earn the government subsidy of $750,000 annually. Since they were placed in service, they have met with an unusual amount of heavy weather, and it is not likely that an attempt will be made to obtain the contract speed until the winter season has passed. That this is well within their powers seems probable, when we remember that the "Lusitania" averaged 25.4 knots over a 1,200-knot course, and that the "Mauretania" for the same distance averaged over 26 knots. Thus far the 70,000 horse-power turbine engines in these ships have proved an unqualified success. They are absolutely free from vibration—such vibration as exists being due to the propellers. They surpass the reciprocating engine in their ability to hold the ships up to their work, when driving into a head sea; they do not race; and the coal consumption is less than was predicted, being something under 1,000 tons per day. Although none of the rival companies shows any disposition, as yet, to build a vessel or vessels to compete with these in speed, the Hamburg-American line has ordered a ship of the intermediate freight-and-passenger type, which will exceed them in size. She will be something over 800 feet long, 90 feet beam, and of nearly 50,000 tons displacement, the great increase in displacement being largely due to the fuller form of the underwater body of the ship. The White Star Company, also, is proposing to build another mammoth steamer for its service of the same general type. In these new ships it is proposed to overcome the inconvenience, due to the inability of the turbines to reverse, by installing a combination of turbine and reciprocating engines, and using the reciprocating engines for the first stage of the expansion, and the steam turbines for the low-pressure end of it. The reciprocating engines would be used, of course, for going astern.

Electrical.

Under the section of the present review entitled "Steam and Electrical Railroads," we have dealt at some length with what was unquestionably the most important application, during the year, of electrical improvements to commercial uses. In that other broad field, in which lies such great promise of future usefulness—wireless telegraphy and telephony—the progress of the year has been marked more by the steady application of the art to practical uses than by the announcement of any startling discoveries. In October, Marconi, who has never himself been given to premature announcements of what he could accomplish, stated that he was about to open his system for the transmission of commercial messages; and on the seventeenth of the month, the plant was officially declared to be ready for the sending of press despatches. It was officially announced by the company that over ten thousand words were sent and received on the opening day. One of the leading New York daily papers has been subsequently publishing what purport to be wireless messages received in the regular routine of operations of the system. Very gratifying has been the progress in wireless telephony. De Forest, who makes use of an improvement of Thomson's system, which involves the use of the vibrating arc, has had the satisfaction of seeing his telephone adopted by the United States Navy; and the Pacific fleet is fully equipped with his system, which is said to be giving very satisfactory service. Toward the close of the year Poulsen, who also uses the vibrating arc, created something of a sensation by the announcement that he had succeeded in sending telephonic messages of great clearness for a distance of over 200 miles between two European cities. There has been a decided revival of interest in facsimile telegraphy, and of the work accomplished in this direction that of Korn seems to have attracted the most attention. He makes use of that property of selenium, by which its conductivity varies with the intensity of the light that falls upon it. Korn also combines photography with the selenium method. The principles he uses would seem to give promise of some success and he seems to be in a fair way to overcome the difficulty, if not impossibility, of sending over a wire images of actual living objects. Belin has followed the older principle of transmitting images by mechanical and electrical means alone.

Chemistry, Astronomy, and Photography.

The most startling chemical announcement of the year came from Sir William Ramsay. To the astonishment of the scientific world he stated that sulphate of copper when exposed to radium emanation was transmitted into lithium and probably also into sodium. His work would seem to show that the emanation of radium is transformed into helium, neon, or argon, and that similarly copper under the enormous influx of energy brought to bear on its atoms, may turn into lithium, sodium, and potassium, all of which have smaller atomic weights than copper and all of which are usually classified in the same group. He has also obtained some confirmatory evidence that thorium is degraded into carbon, appearing as carbon dioxide.

Berthelot's experiments in changing the colors of crystals by means of radium emanation have been elaborated by Bordas with astonishing results. It is generally considered that radium and possibly actinium are ultimately descended from uranium, and until recently it was thought that the immediate predecessor or parent of radium was actinium, the latter descending more or less directly from uranium. The relationship, however, has never been definitely established, and a recent investigation by Dr. E. Rutherford seems to show that actinium is not the parent of radium; that although it may represent one generation, the true parent has not yet been identified nor named. Because no method of controlling the changes or transmutations has been discovered, experiments are slow. The determination of the atomic weight of radium published by Mme. Curie in 1902 has been revised. Her more recent researches would indicate that the atomic weight is 226.2, with a probable error of less than half a unit. The experiments performed in 1902 gave a mean of 225.

The most stirring astronomical event of the year was the opposition of Mars. It brought to the fore once more the old controversy whether Mars is inhabited or not, and whether the planet is really interlaced with the canals that Schiaparelli and Lowell have described. The photographs taken for Prof. Lowell by Mr. Lampland and Mr. Slipher would seem to settle once and for all the question of the existence of the canals, and to justify the accuracy of Prof. Lowell's observations. Whether or not the opposition revealed anything that was startlingly new beyond this photographic confirmation of visual observation, may be doubted. The discovery of a comet by Daniel of Princeton Observatory also attracted attention largely because it was the most luminous body of its kind that we have seen in many years. Its orbit proved it to be of the parabolic variety. The transit of Mercury, which can hardly be said to be of exceptional scientific interest apart from the fact that it may indicate the existence of an intramercurial planet, was noteworthy for the fact that it did not occur exactly at the stipulated time. The knots in Saturn's rings caused not a little astronomical stir. First observed at Lick Observatory on July 2nd, the knots disappeared when the sun came into the plane of the rings, and reappeared on October 13th, since which time they were easily visible. Prof. Lowell holds that these knots are due to a falling in of the rings on the planet itself, an opinion which is not shared by other astronomers.

In photography by far the most important event of the year was the publication by the Lumière brothers of their methods of photographing objects in their natural colors by means of a single plate only. In their process a glass plate is coated with a foundation transparent film in which is mixed in equal proportions extremely minute starch particles colored respectively red, blue and yellow, upon which particles the usual sensitized film is spread. The rays of light affect the sensitized film in proportion to their color and intensity. The negative obtained is chemically transformed into a positive so as to exhibit the colors of the original with wonderful accuracy.

Obituary.

In recalling the names of men distinguished in the arts and sciences, who have died during the year, one is struck with the fact that in so many cases their useful life extended well into three score years and ten. Notable in this respect was Charles Haynes Haswell, the civil engineer of this city, who continued in the prosecution of his work uninterruptedly for over three-quarters of a century. As long ago as 1836 he was an engineer in the United States navy and nine years later he became Engineer-in-Chief. Haswell's "Pocket-book," alone, served to make his name known through the whole English-speaking world. To his professional ability and achievements he added the grace of a character of unusually high quality. Another noted engineer whose death occurred last year was Sir Benjamin Baker, undoubtedly one of the greatest masters of his profession that the world has ever seen. His greatest works were the cantilever bridge over the Firth of Forth, Scotland, and the well-known Assouan Dam in Egypt. Each of these undertakings cost over fifteen million dollars, and each, because of its unprecedented character, called for the highest constructive skill. The death was recorded also of Sir William Perkin, founder of the coal tar industry. He was only eighteen years of age when he discovered mauve. The process was patented and his dye was a pioneer which cleared the way for all who came after it. It completely revolutionized the dyeing and textile printing industry, and gave rise to an amount of chemical research in the coal tar colors which is probably without an industrial parallel. The closing days of the year witnessed the death of Lord Kelvin, who was probably the most renowned scientist and inventor of his age. Born in Belfast, on the 26th of June, 1824, he was in the 84th year of his life when his death occurred on the 17th of December. He possessed to a rare degree a genius alike for discovery, invention, and design; for he gave to the world as the result of his investigations some of the most practical and useful of its scientific apparatus and engineering and mechanical instruments. The limitations of the present review prevent any enumeration of his works. To his great mental qualifications he added a character which endeared him to all with whom, in the course of his long professional life, he came in contact.

Marcellin Berthelot, whose name must also be added to this list, has been described by Sir James Dewar as "a colossus to be compared to Liebig, without any modern parallel." His first research was an elaborate study of the constitution of fats, which research led him to perfect syntheses, that is to the preparation of organic substances from elementary substances. While engaged in these remarkable researches Berthelot also placed thermo-chemistry on a sure basis. In his eightieth and last year he was engaged in studying hæmoglobin (the chief constituent of the red blood corpuscles), the absorption of carbon dioxide by plants, the heat evolution of radium, and the reactions produced by the silent electric discharge in the tubes which bear his name.

Dmitri Ivanovitch Mendeléef, who also passed away, was a suggestive idealist, essentially a seer. He first studied crystallography and isomorphism and then the relations between the pressure and the volume of liquids. His researches on gases brought him to a study of atmospheric circulation. With the periodic law, however, his name will be pre-eminently coupled. His arrangement of elements in twelve series of groups of seven or more elements according to increasing atomic weights was daring, because the constants of the elements which he regarded as periodic functions of the atomic weights were less perfectly known then. His arrangements were justified by subsequent discoveries. In one of his latest speculations he suggested an ingenious chemical conception of the ether as a legitimate extension of his periodic law.

In the death of Prof. Henri Moissan, France has lost a scientist to whom belongs the credit of having rejuvenated inorganic chemistry in an age devoted very largely to organic research. Moissan studied the evolution of oxygen and of carbon-dioxide by plants in the dark, investigated the oxides of the iron group of metals, and took up with distinguished success the isolation of fluorine, a task which so many distinguished experimenters had failed in accomplishing. The work, however, which attracted most popular attention was his preparation of artificial diamonds by melting iron and carbon in a crucible and dropping the fused mass into water. His elaborate investigations with the electric furnace enabled him to throw not a little light on the subject of carbides.

As the result of a landslide in Russian Turkestan, the town of Karatagh has been wiped out. Out of a population of 3,500 people, less than 100 escaped. The disaster was due to an enormous section of the Karatagh Mountain, which overhung the place, breaking loose and thundering down, almost completely burying the town. In Spain an earthquake has occurred in Huesca province. Many wide cracks opened in the earth and a number of houses were shaken down.

The Agricultural College, Tokio, recently announced that it had discovered a method of making pulp from bamboo grass, sasa, for which the highest results are claimed. The bamboo grass is very common in Japan, and has been put to little use. It is proposed to teach the method to the Japanese farmers, and, as it is hoped that pulp will be produced cheaply by it, both the farmer and the consumer should benefit. The matter is still under investigation, and no details are obtainable.

THE HEAVENS IN JANUARY.

BY HENRY NORRIS RUSSELL, PH.D.

The principal astronomical event of this month is a total eclipse of the sun, which takes place upon the 3d. This is an unusually long eclipse, for it occurs within a few hours of the time at which the moon is nearest us, and consequently her tapering shadow, where it reaches the earth's surface, is wider than usual. The greatest duration of totality is 4 minutes and 12 seconds, which would give astronomers a rare opportunity to make observations and take photographs, if only they had *terra firma* to stand on while they were doing it.

Unfortunately, the track of the shadow, which is fully 8,000 miles long, lies entirely in the Pacific Ocean, beginning north of New Guinea and sweeping eastward all the way to the coast of Central America, which it reaches just as the sun is setting.

The only stations where instruments can be set up are a few small islands, and to one of these, Flint Island, an expedition consisting of parties from the Lick Observatory and the Smithsonian Institution is now on its way, in the United States gunboat "Annapolis." We may hope to hear of their results a few months hence. Meanwhile we may note that the eclipse will be visible, as a partial one, from the extreme southwestern portion of the United States, shortly before sunset.

THE HEAVENS.

Turning from these phenomena, which we will not be in a position to observe, to the starry skies, which are visible to all alike, we find the most splendid display of the year, especially in the south and east.

Due southeast, and by this time high up, is Orion, probably familiar to more people than any other constellation, except perhaps the Great Bear. Above this is the Bull, with the ruddy Aldebaran and the Pleiades, and below it is the Great Dog, with the incomparable Sirius, which is more than three times as bright as any other star that we ever see. The star β, near Sirius on the right, and the group that forms an irregular cross below, are thrown into the shade, so to speak, by their brilliant neighbor, and it is by hiding Sirius with the hand that we may most easily convince ourselves that they are really stars of very considerable brightness, comparable with those of Orion's belt, for example.

Below Sirius on the right is the small constellation of the Dove, and to the west of this, extending as high as Orion, is the long stream of Eridanus, well indicated on our map, though there are many fainter stars, not shown thereon, which help to mark its course.

To the west of this again is Cetus the Whale. The variable star Mira (lettered *o*) is now fading, having passed maximum in November, and will probably become invisible to the naked eye this month and remain so until August.

The Fishes (Pisces) are not of themselves at all conspicuous, but at present they are very much brightened up by the presence of Saturn and Mars, which at the time indicated on our map are low in the southwest, very close together at first, and later in the month with Mars the higher.

Pegasus and Andromeda occupy the western sky, with the Ram and the Triangle south of the latter. Perseus is almost overhead, and so is Auriga (the Charioteer) with the great yellow star Capella.

Gemini the Twins may be seen high up in the east, and lower down is the Little Dog, whose one bright star Procyon forms an almost equilateral triangle with Sirius and Betelgeux in Orion.

The Crab (Cancer) contains no bright stars, but at present it has within its limits the planet Jupiter, which is the brightest thing in all the midnight skies, and more than makes up for the lack. Below Jupiter, on the right and left, the Sea Serpent and the Lion are rising. Finally, of the circumpolar constellations we may find Cassiopeia and Cepheus to the right of the pole in the northwest, the Little Bear and the Dragon due north, and the Great Bear coming up in the east, the tip of its tail hanging down almost to the horizon.

THE PLANETS.

Mercury is morning star until the 14th, when he passes through superior conjunction (behind the sun) and becomes an evening star. He can only be observed at the end of the month, when he is pretty favorably placed, setting about one and one-half hours after the sun.

Venus is likewise an evening star, and is daily becoming brighter and more conspicuous. She is rapidly moving northeastward through Capricornus and Aquarius, and remains in sight longer each evening than the last, till at the end of the month she sets at about 8 P. M.

Mars too is an evening star in Pisces, and sets about 10:30 P. M. in the middle of the month. At the beginning of the month he is very near Saturn, but he gradually draws away from him to the eastward as the month progresses.

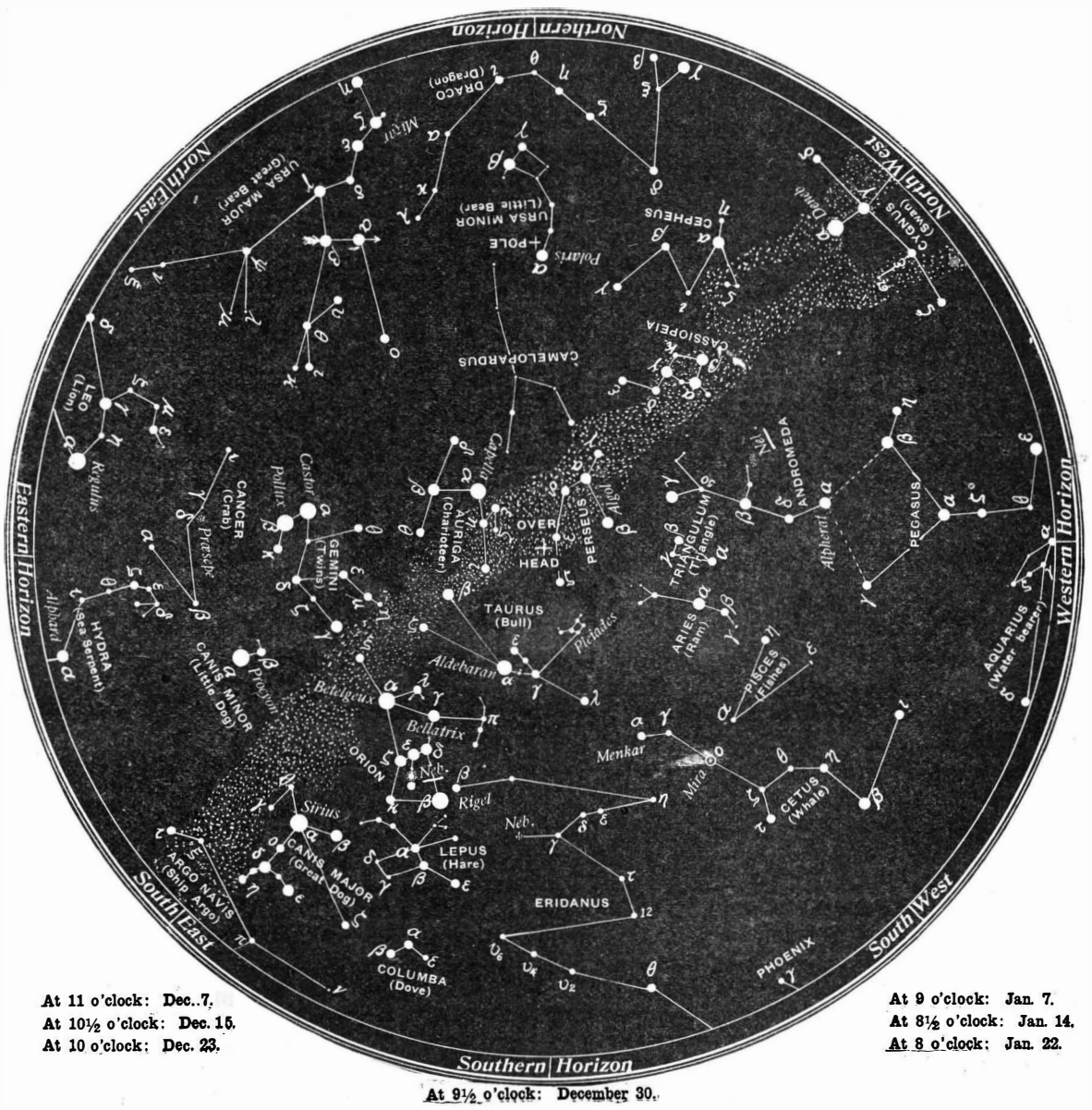
Jupiter is in Cancer, and comes to opposition on the 29th, at which time he rises at sunset, and is visible all night long. Saturn is evening star in Aquarius, and sets about 10 P. M. in the middle of the month. Uranus is in conjunction with the sun on the 4th, and is invisible this month except that he may perhaps be seen or photographed during the total eclipse, at which time he is within a degree of the sun.

Neptune is in Gemini, and comes to opposition on the 4th. His position on the 5th is Right Ascension 6 h. 58 m. 12 s., Declination 21 deg. 56 min. north, and he moves 7 s. westward and 10 s. northward per day.

THE MOON.

New moon occurs at 5 P. M. on January 3d, first quarter at 9 A. M. on the 10th, full moon at 9 A. M. on the 18th, and last quarter at 10 A. M. on the 26th. The moon is nearest us on the 4th, and farthest away on the 18th. She is in conjunction with Mercury and Uranus on the 3d, Venus on the 5th, Saturn and Mars on the 8th, Neptune on the 17th, Jupiter on the morning of the 19th (pretty close) and Uranus once again on the 31st.

Princeton University Observatory.



At 11 o'clock: Dec. 7.
At 10½ o'clock: Dec. 15.
At 10 o'clock: Dec. 23.

At 9 o'clock: Jan. 7.
At 8½ o'clock: Jan. 14.
At 8 o'clock: Jan. 22.

At 9½ o'clock: December 30.

NIGHT SKY: DECEMBER AND JANUARY

According to the latest estimate, the loss of life due to the earthquake which recently destroyed the city of Karatagh in Bokhara and the surrounding country, is approximately 10,000 persons.

Specifications for the Army Flying Machine.

On December 23 the Signal Corps issued specifications and invited bids for a heavier-than-air flying machine which it is proposed to build in the near future.

The specifications provide for a machine which shall be capable of traveling at the rate of 40 miles an hour in still air and carrying two men aggregating 350 pounds, as well as sufficient fuel for a flight of 125 miles. A trial flight of one hour's duration, during which the machine must fly in all directions, i. e., both with and against the wind, is required before any machine will be accepted. The tests as to speed will be made over a 5-mile course, the time being taken in both directions on three separate flights. All bidders are required to send in a certified check representing ten per cent of the amount of the bid. These checks will be returned to the bidders after the awards have been made. Bids will be received up to the first of February.

In taking this step, the War Department has recognized that a dynamic flying machine is now a reality; so our government is now in advance of all foreign powers in the recognition of this fact. As no one has come forward and won the SCIENTIFIC AMERICAN trophy for a flight of a kilometer in a straight line, thus far, however, it is extremely doubtful whether there will be any bidders to compete for the government contract for such a machine.

The Current Supplement.

The elimination of friction from bearings is one of the most important topics that can engage the attention of the mechanical engineer. J. F. Springer admirably handles this subject in the current SUPPLEMENT, No. 1670. Another article of engineering interest is the continuation of Prof. Watson's paper, constituting the eighth installment of his treatise on "The Elements of Electric Engineering." "The Mastery of the Ocean" is a discussion of the relative heights of ocean waves compared with the new Cunarders, "Mauretania" and "Lusitania," and of the superior steadiness of those ships. Specifications for the construction of a flying machine for the army, published by the Signal Corps, are given in full. A metal-working planer, probably the largest and heaviest ever built, is fully explained and illustrated. James Furman Kemp's article is concluded. That the popular game of "diabolo" is older than many of us suspect, is shown in an interesting historical article illustrated by quaint contemporaneous engravings. Prof. Dunbar, of Hamburg, recently published an account of experiments which apparently prove that bacteria and yeast mold fungi are produced by algæ. So revolutionary and startling a theory advanced by a biologist of repute has aroused lively interest, for which reason we publish in the current SUPPLEMENT an article on the subject by Dr. C. Lauenstein. Dr. Everette's interesting paper on the geology of the Klondike is concluded.

The Rodah Bridge at Cairo is practically finished as far as the structural work itself is concerned. This bridge is now undergoing the official tests, but it will not be publicly opened to traffic until the terminals of the structure are finally completed, together with the approaches at one end. This is a work that will probably take some time to accomplish. The tests are of a severe character, dead weights of sand and steel rails being piled up on each pier in succession, exerting a pressure of 1,000 tons. Subsequently live weights of steam rollers and tramcars loaded with sand and water carts filled with water are to be run on the bridge, with a total pressure of 460 tons on the main girders. The tests so far have been, so we gather, satisfactory in their results. No fault or strain has been revealed in the material.

THE FASTEST WARSHIPS AFLOAT.

There is now being completed and tried out for the British navy a most interesting class of ocean-going destroyers, whose contract speed of 33 knots an hour is being greatly exceeded on their trials. There has been a steady growth of late years in the size of the destroyer type, the displacement rising from 350 to 500 tons, and now, in the case of these vessels in question, to between 750 and 800 tons. The increase in size is due to the demand for destroyers which can keep the high seas for a considerable period of time, and maintain a high speed under conditions of severe weather. The class which was authorized in 1906 includes five vessels of approximately similar dimensions. One of these, the "Ghurka," which has recently been built by Hawthorne, Leslie & Co. on the Tyne, is shown in the accompanying photograph undergoing an unofficial builders' trial, in which she made a speed of 34½ knots an hour. The "Ghurka" is 255 feet in length, 25½ feet in beam, 8 feet in depth, and of 750 tons displacement. She is designed to carry 95 tons of oil fuel, and to make a speed of 33 knots with 14,250 horse-power. It will be seen that she conforms to the standard destroyer type, having a high forecastle deck forward, low funnels, and a short signaling mast. All of the vessels are fitted with turbine engines, of which there are seven, working on three shafts. In the case of the "Ghurka" there is one high-pressure turbine on the center shaft, exhausting into two low-pressure turbines on the wing shafts, the two astern turbines being carried also on the wing shafts. Ahead of the low-pressure turbines on the wing shafts are a high-pressure and a low-pressure cruising turbine. Steam is supplied from five Yarrow water-tube boilers working at a pressure of 220 pounds. Oil fuel only is used, the only coal carried on the vessel being that used for heating and cooking purposes. The "Ghurka" is armed with three 12-pounder quick-firing guns, two being carried on the forecastle and one aft. She mounts two deck torpedo tubes. The conditions laid down by the Admiralty which have to be fulfilled on the twenty-four hours' consumption trial are that the vessels shall have a radius of action of 1,500 miles at a speed of not less than 13 knots per hour. The "Ghurka" has more than realized these conditions, and has proved herself to have a radius of action of 1,715 knots at a speed of 13½ knots per hour. If what are known as the Peace tanks are also filled, she is capable of steaming almost 2,500 knots without a stop, which is equivalent to a voyage across the North Atlantic to Canada, or a run from the Tyne to Malta. This is a much larger radius of action than any other vessels of the type have yet attained. This trial was completed on Friday evening, off Yarmouth, after which the vessel proceeded to Sheerness, took in oil fuel, and sailed for the Tyne on Saturday morning at 8 A. M., arriving off Tynemouth piers—a distance of 270 miles—at 6 P. M., thus reaching home sooner than could be done by coming by train from Sheerness to Newcastle, a continuous speed, in a moderate sea, of 27 knots being comfortably maintained with four-fifths of her boilers.

The recent trials of the "Mohawk," another of this class, built by White & Co., of East Cowes, indicate that they will be unusually fast and economical vessels. The contract called for 33 knots for six hours with a fuel-oil consumption not greater than one pound per square foot of heating surface. The actual consumption was 0.86 pound, an economy of 14 per cent on that allowed. This economy is rendered the more remarkable because of the great speed achieved of 34.5 knots on the measured mile and 34.24 knots for six hours' steaming. The "Tartar," another vessel of this class, recently averaged 35.36 knots on her six hours' trial.

TARGET PRACTICE—ONE ELEMENT OF OUR NATIONAL COAST DEFENSE.

BY J. F. HOWELL, CAPTAIN COAST ARTILLERY CORPS.

If self-preservation is the first law of nature, perfect national defense should be a country's highest aim. This being true, I feel sure that many citizens of a nation having thousands of miles of coast line, will be interested in the means employed for its defense.

The limits of a single article, especially an illustrated one, preclude the possibility of discussing the entire scheme of coast defense, and I propose to show only our preparedness, where provided with material and personnel, in one element of its defense—gun fire covering the outer harbor. This might be called the second line of defense, the first being the ships of war, if forced to assume the defensive; the third, the submarine mines and their accessories.

Simple as it is to those familiar with seacoast fortification methods, through residence in their neighborhood or through visits during the vacation season, to the uninitiated, gun fire at moving objects at a distance of five or six miles, especially where "the man behind the gun" cannot see what is being aimed at, is a difficult proposition to understand. The use of the mortars and the action of the disappearing gun carriage have been the two questions most frequently "cropping out," and "How do you know how to aim to hit anything moving so far away, especially when the gun is down in a well like these mortars?" is the usual inquiry after visiting a mortar pit.

A mortar pit is constructed by banking up a vast quantity of earth to the height of 25 feet and the depth of 50 feet, more or less, around a concrete box, open at the top and to the rear, containing four cannon, each about 12 feet long and weighing about 14 tons. These cannon fire a projectile 12 inches in diameter and 3 or 3½ feet long a distance of 7 miles and to great height, with the object of dropping on the deck of the warship target.

These mortar pits are usually at a distance from the water, and some of them are retired half a mile. Unlike a direct-fire gun, the best result is not obtained at a close range. The damage done by the mortar projectile is due to its weight and the force of gravity—the higher the projectile goes, the farther it goes out into the harbor, the greater its force where it falls. The greater range of a direct-fire gun, the less the striking force of the projectile, the loss of energy being due to the action of the force of gravity and the resistance of the air acting to overcome the velocity given the mass by the powder gases in the gun.

How do we hit with the mortars? An observer near the shore who sees the target communicates the horizontal and vertical angle at which to lay the mortar, and the instant of time at which to fire, and the gun does the rest. If you were standing at the center of a large clock dial laid flat on the ground, and wanted to hit, with a baseball, a man walking around on the outside, you would notice how long it took the man to get from I to II, and again from II to III; then you would decide whether, if the ball were thrown over a point half way between IV and V just as he arrived opposite IV, the man and the ball would reach the same spot at the same time—it being understood, of course, that he maintained uniform speed and direction, and that the ball was thrown with proper force. Instruments give us the range and observations, and mechanical devices give us the range differences, increasing or decreasing by certain short intervals of time, too short for a ship of any size to escape by attempting to change direction or speed. Our observer's circle has 36,000 divisions.

The main features of the disappearing gun carriage are the gun levers pivoted at the center. One end of these levers carries the gun above them, and to the other end is attached lead counterweights to overbalance the weight of the gun. The gun is held below the parapet during loading by pawls engaged in a toothed rack. When the pawls are withdrawn the counterweight drops into a well, pulling one end of the levers down and lifting the other end bearing the gun, which rises gracefully over the edge of the parapet. The shock of discharge forces it back behind the parapet, raising the counterweight, and the pawls engage at the instant the gun comes to rest in the loading position. A simple system of oil-filled cylinders takes up all shock.

Now we come to the question, What are we able to effect with the guns that defend our outer harbors?

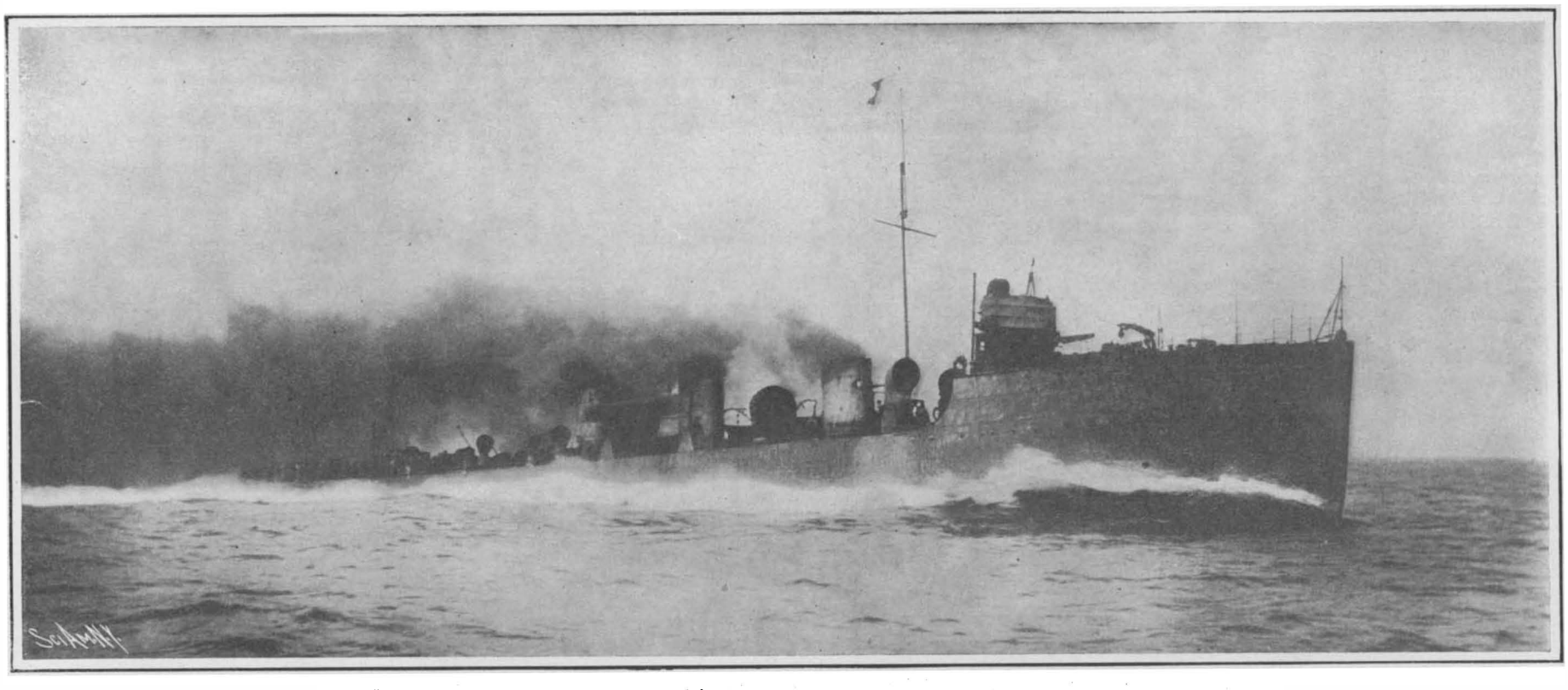
First let us take the mortars. In moving from a range of 10,000 yards into one of 4,000, a squadron or fleet would be annihilated by mortar fire alone in attempting to enter any of our harbors where mortars are installed, provided conditions permitted accurate observations. Mortars are not as accurate in their fire as guns, but four are fired simultaneously, and sometimes eight, sixteen, or even thirty-two, and the slight variation in range due to irregular powder, or intentionally slight variation in laying, would cover a given portion of the channel so effectually that it would mean destruction to any craft entering the zone of fire. One or at most two mortar projectiles at mid or long range would end the career of the heaviest ship afloat as a fighting unit.

How accurate is mortar fire?

I have seen them fired singly when the projectile from one gun fell within 5 yards of a standard target about 12 feet square, and another projectile fell within 10 yards, while many of them fell about the target within the area of a ship's deck, and one fell on the flagstaff of the target.

As an example of what has been done in the matter of fire command service practice, even before the full development of the present approved system of installation and control, reference is made to the work of a group of six batteries of 8, 10, and 12 inch guns at Fort Monroe, July 22, 1905.

The officers commanding had been but a few days with the batteries; so the credit of the work must be largely given to the enlisted personnel, their regular officers, and the fire commander. Different lots of powder were used; ranges were not known, except as they were determined by the position finding system; it was not known when any battery would be directed to fire; and the course of the targets was in the shape of an irregular figure eight at a constantly irregular



Length, 255 feet. **Beam,** 25½ feet. **Depth,** 8 feet. **Displacement.** 750 tons. **Horse-Power,** 14,250. **Speed,** 34½ knots.

THE OCEAN-GOING DESTROYER "GHURKA" MAKING 34½ KNOTS.

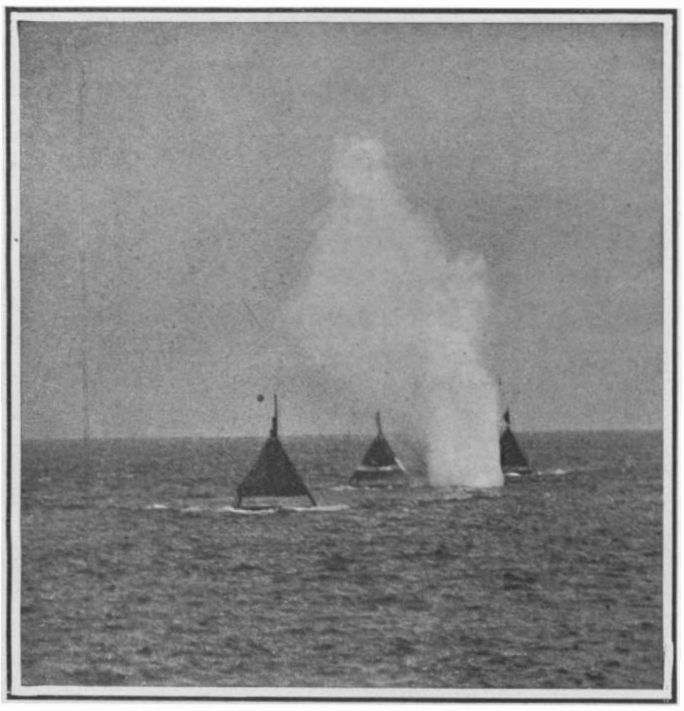


Fig. 3.—A Ricochet and Hit at 6,000 Yards With a 6-inch Shell.

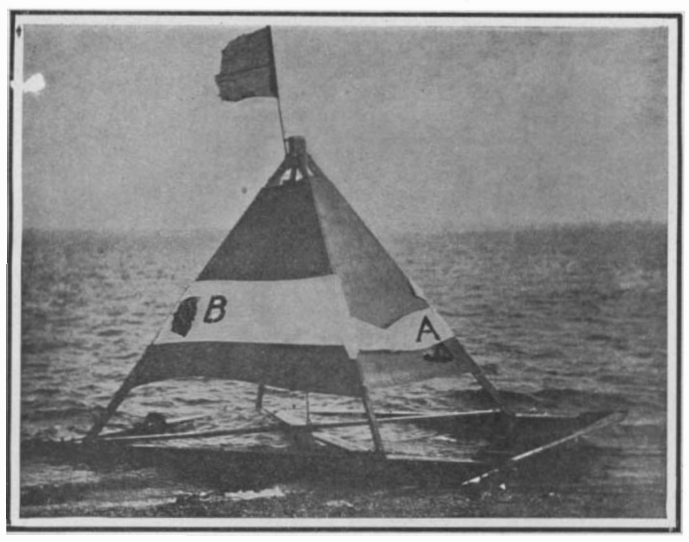


Fig. 4.—Holes Made by Hit Shown in Fig. 3.

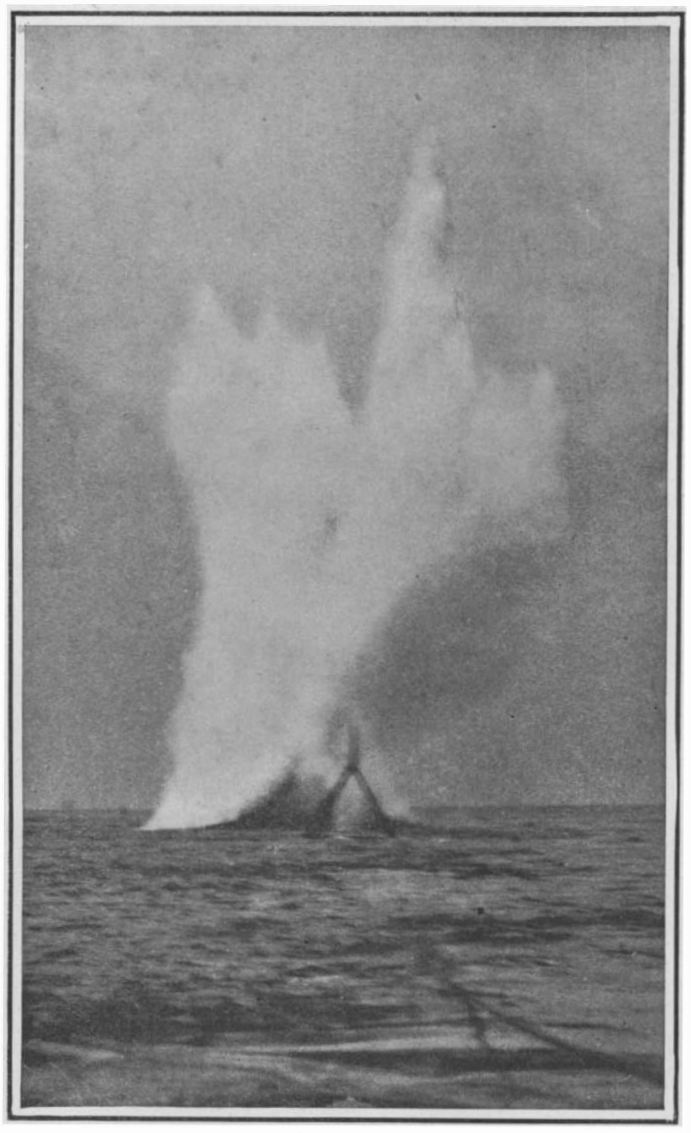


Fig. 6.—Strike of a 12-inch Shot, Range, 6,400 Yards. Speed of Target Across the Range, 7½ Miles an Hour.

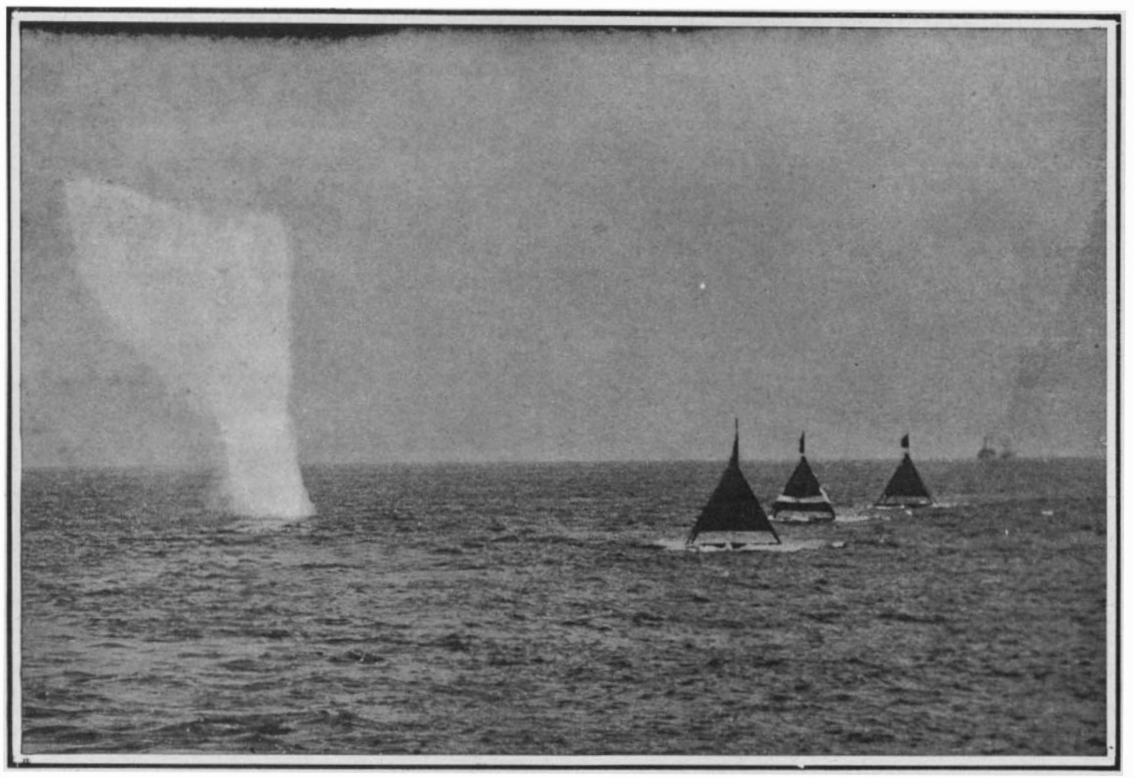


Fig. 1.—View from Deck of Tug Towing the Three Targets at 8 Miles an Hour Across the Range. Splash of 6-inch Shell That Was 24 Yards "Over." Range, 5,500 Yards.

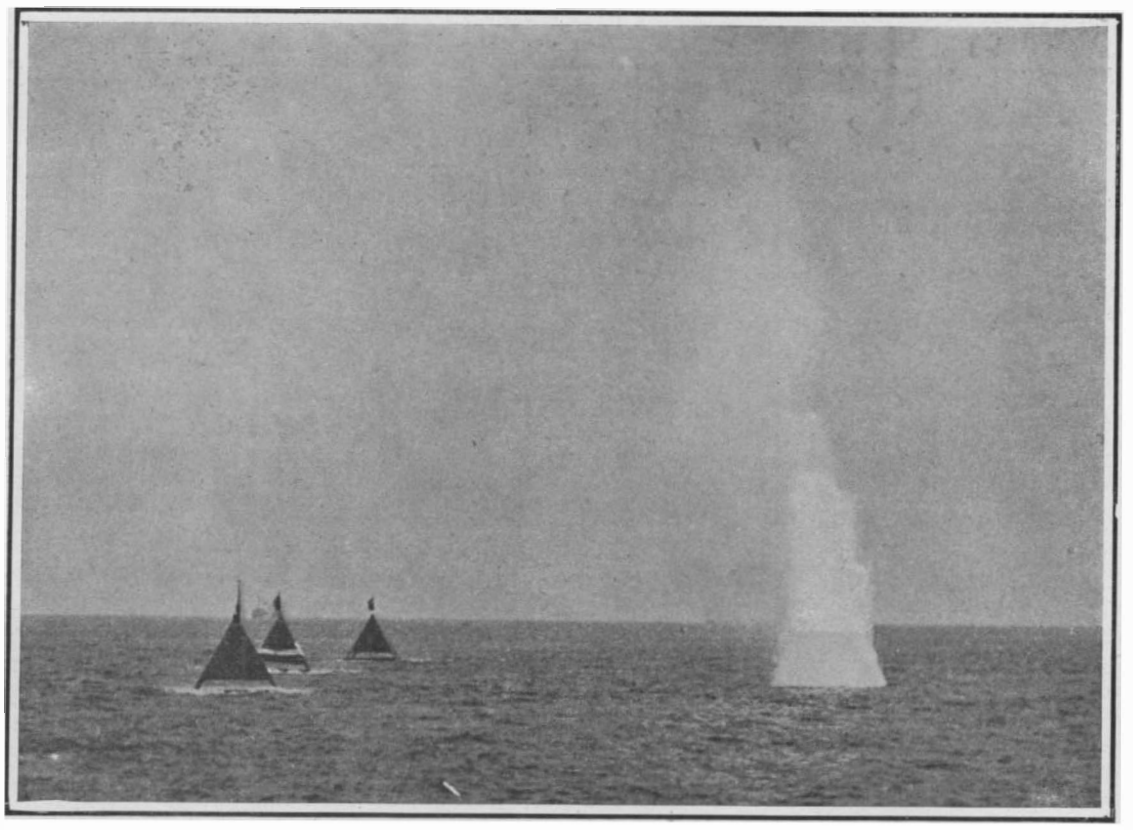


Fig. 2.—Splash of a 6-inch Shot 32 Yards "Short." Range, 5,300 Yards.

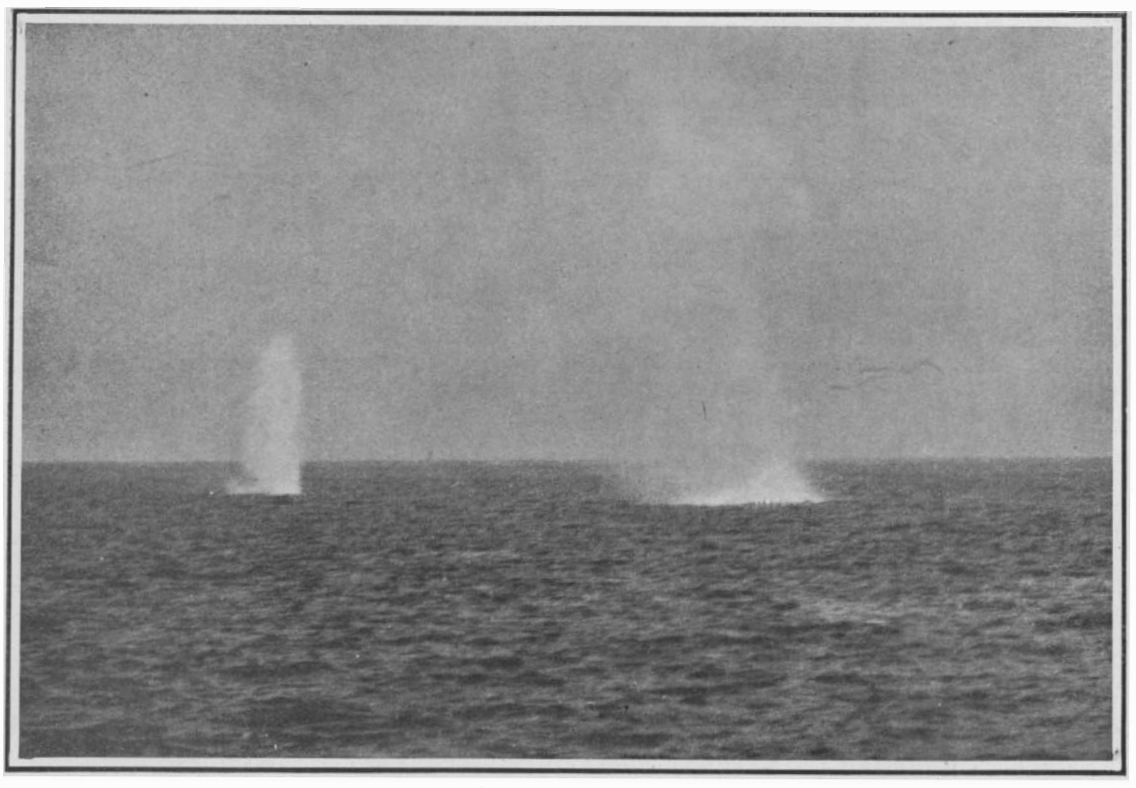


Fig. 5.—A Miss and a Ricochet.

TARGET PRACTICE—ONE ELEMENT OF OUR NATIONAL COAST DEFENSE.

variation in range. Forty-one shots were fired, not in a continual string but in irregular series of one, two, or three shots from a battery at a time; or a concentration of two, three, or four batteries firing on one target one, two, or three shots as ordered. Two of these batteries made a score of 75 per cent of hits, the others varied from 43 per cent to 62 per cent, resulting in a general average of 61 per cent. Under the practice order then in force, the width of target allowed for scoring a full hit was 75 feet, height 24 feet. The strike of each shot was carefully observed from shore and from the tug and recorded and compared, and the record was finally compiled by Major E. M. Weaver, A.C. The accuracy of the record is not open to question.

Many individual batteries have done much better work. A record of 100 per cent is not at all unusual. War Department orders have limited target practice to one or two batteries at a time. Hence the Fort Monroe practice referred to probably more nearly approaches service conditions than any that has been held.

Some of the results of the recent practice in one of the Artillery Districts are shown in the accompanying photographs.

Three targets were taken in tow at a speed of about 8 miles per hour, over a course such that the ranges were unknown except as determined by the position-finding system. Because of the movement of the tug and the necessity of changing the plates in the camera, only four of the ten succeeding shots were caught at the instant of strike. In the three showing the target and the splash, the measured variation in range on the photograph agrees with the computed variation from observation with the "range rakes." Figs. I. and II. show the strike of an "over" of 24 yards and a "short" of 32 yards, fired at the moving target at a range of about 5,500 yards. The photographs were taken from the tug which was towing the targets.

The battery did excellent work: 5,300 to 6,000 yards is long range for a 6-inch gun. Six hits out of ten record shots fired in 3 minutes and 13 seconds was the record of the practice; that is, six of the ten shots would have hit a ship 24 feet high and 60 feet beam. One shot actually hit the small target on which the gunner sighted his piece. This was the shot shown in Fig. III., and it is interesting as showing that the projectile, weighing 106 pounds, must have been instantly deflected upward, for, although the strike was only a few feet in front of the target, the shot entered the canvas on ricochet at *A* and passed out at *B*, Fig. IV.

It will be noticed that the targets occupy a curved line, and the center one is "canted" with reference to the battery, so the projectile pierced adjacent sides and not opposite sides of the target, as would be expected. Fig. V. shows a miss and a ricochet. The second strike is so near the first that the projectile could not have traveled many feet under water, but must have come out at the far edge of the first splash. There is no other disturbance of the water.

Fig. VI. shows the strike of the third record 12-inch shot at the moving target towed at 7½ miles per hour, at about 6,400 yards from the gun. The flotation timbers of the material target were struck, and only enough fragments were collected and brought in, to prove to any doubting mind that the target had not been cast adrift or hidden among the rocks.

It should be borne in mind that these views were not selected from various artillery districts on different occasions widely separated as to dates, nor from specially-trained companies. The photographs shown are of shots fired at the usual semi-annual practice in the Artillery District of Boston between November 5 and 15, 1907.

What Is a Knot?

In referring to the speed of vessels, we speak of the number of knots traveled. A knot is a measure of speed, not of distance, and the term comes from the old method of finding the speed of a vessel by means of a three-cornered piece of wood with a weight attached to one side to hold it upright in the water. To each corner was fastened a cord and to the junction of these cords was attached the log line. This log and line with a small sand glass completed the apparatus for reckoning a vessel's speed. The log, when dropped into the water, remained where it fell. The log line was divided off by knots, the distance between the knots being the same fractional part of a nautical mile as the time measured by the sand glass was of an hour. Therefore the number of knots which ran out in the time measured by the sand glass represented the number of nautical miles an hour that the vessel was running. For example, if six knots ran out during the time, the vessel's speed was said to be six knots.

The "Chartreuse" Trade Mark.

In 1901 the French legislature passed a law known as the "Associations Act," as a consequence of which the order of Carthusian Monks (Pères Chartreux) were expelled from France in 1903. The French courts appointed a "liquidator" (receiver) who seized what there was left of the monks' tangible property, appropriated their French trade marks, and then began the making of a liqueur which he put on the market as "Chartreuse," using the same bottles, labels, wrappers, etc., formerly used for many years by the Carthusians. Under supposed authorization of the French courts, the liquidator then made attempts, several of which were temporarily successful, to have transferred to his name in countries foreign to France the ancient trade marks of the monks. This "Chartreuse" made by the liquidator was put up in the old bottles, and under the old labels made famous by the monks, and was put on the market and extensively advertised in the United States, England, Germany, Switzerland, Belgium, Holland, Brazil, Argentine Republic, and other countries. In all of these countries suit was brought by the Carthusian monks against the liquidator or his agents, which suits have all been decided favorably to the monks.

In January, 1905, suit was brought in the United States against the distributing agent of the liquidator and his successor, to restrain the importing and selling of the imitation liqueur in this country under the name "Chartreuse." The case was argued in the United States Circuit Court before Judge Hough, and attracted much attention, both because of the importance of the property involved and because of the novelty of the questions presented. Judge Hough has now decided that the word "Chartreuse" signifies a liqueur manufactured by the monks, and not a locality or place of manufacture; that the business of the monks was not seized by the liquidator, but was transferred to Spain; that the liquidator was not a successor to the business of the monks, but a competitor; and that the American trade marks of the monks could not pass to the liquidator by operation of French law.

In July, 1907, a decision was rendered against the monks in England; but after the decision by Judge Hough in this country, an appeal was argued in England before the Lord Chief Justice, the court below was reversed, and a broad injunction, similar to that in this country, was granted.

A first shipment of Tongaland and Zululand rubber has been dispatched to London from Durban. A large tract of rubber country is being worked under a concession granted by the Natal government, and regular shipments are expected.

A MOTOR FOR WINTER TRACTION.

A MOTOR FOR WINTER TRACTION.

BY WILLIAM ALLEN.

Among the types of motors employed in the logging industry, are several intended especially for use in winter. The problem of transporting loads of logs from the forests in winter has been given much study by inventors, with the result that snow locomotives, as they might be termed, are now in successful use. Several years ago the Scientific American described a motor which was used successfully in Michigan. The one illustrated here is of a radically different design, especially in the method of securing traction.

Although as many as twenty-one loaded log sledges have been hauled by a motor of this type, its total weight including water supply is less than twenty tons. It develops about 100 horse-power with 200 pounds steam pressure, and on a fairly level surface will move a sleigh train at a speed of from three to five miles an hour. It can be utilized in a rough country, provided the snow is well packed down so as to give a fairly smooth surface.

There are four cylinders, attached in pairs, two engines on each side of the boiler, and fastened to frame and boiler in an upright position as shown. Each pair of engines is equipped with reversing link motion. The traction device consists of two heavy runners, one on either side of engine, carried on a 4½-inch iron shaft. On each end of these runners is attached a pair of heavy boxes in which hammered iron shafts run. Each shaft has a heavy sprocket wheel. These sprocket wheels mesh into and carry the tread or lag chains.

When the engines are started, power is transmitted by a spur pinion on crank shafts to pinions on the front end of the driving shafts. On the rear end of these driving shafts are attached bevel pinions, which mesh in large bevel gears running on brass-bushed quills on main bearing. These bevels also have spur gears attached to them, which carry the power through intermediate gears to another spur gear on the shaft to which the rear sprocket is keyed.

The water tank is carried under the boiler on the same frame, and has a capacity of about ten barrels, sufficient for an average run. The frame in turn is supported by the heavy traction wheels in rear and sled in front. The boilers are 15 feet in length and 36 inches in diameter, and are built to stand a working pressure of 200 pounds to the square inch.

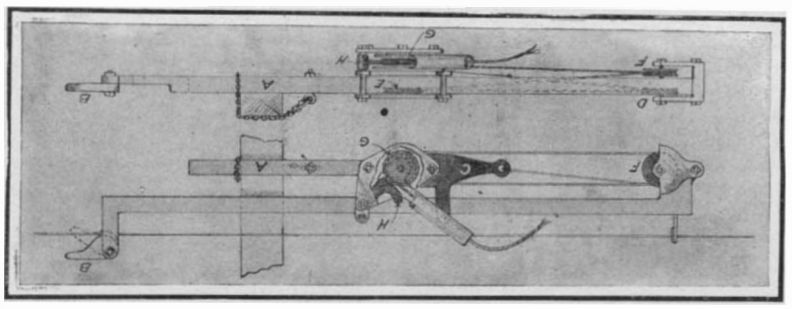
These motors are in wide use in Minnesota and Wisconsin, where one will cover a distance of 50 miles a day, performing a service equal to that of twelve to eighteen four-horse teams.

A Proposed New Style of Lighthouse.

A proposition coming from Germany for a new system of lighting coasts and dangerous marine points for the protection of vessels at sea is noted in the New-Yorker Staats-Zeitung, October 20: A plan worth considering for the entire abolition of lighthouses, which are usually quite expensive, was recently proposed by retired Corvette-Captain Arenhold before the Kiel nautical society. Arenhold starts out with the fact that the navy searchlight signals are visible, in good weather, at a distance of 50 nautical miles, although they are given off at an angle of 45 degrees. He believes, now, that a cone of light which should be cast by means of a reflector perpendicularly upward toward the sky would be visible for at least 80 nautical miles, and that such a perpendicular light (even if of less strength) must be visible further than the horizontal pencil of light from a light-tower 65 to 98 feet high. The important discrimination among the individual beacons could be accomplished without difficulty by means of different colors and different forms for the sheaf of light. The German Imperial navy office purposes to make extensive experiments at Friedrichsort, near Kiel, in the near future, with a view to testing the practical utility of Arenhold's plan. Besides the cheapness, the new system of lighting coasts would have, in case of war, the special advantage that lighthouses would no longer present to the enemy, as now, even when their lights are extinguished, marks visible at a great distance that tell him his position; the low new lights, when they are put out, would be very much less easy to find.

DEVICE FOR STRETCHING WIRE.

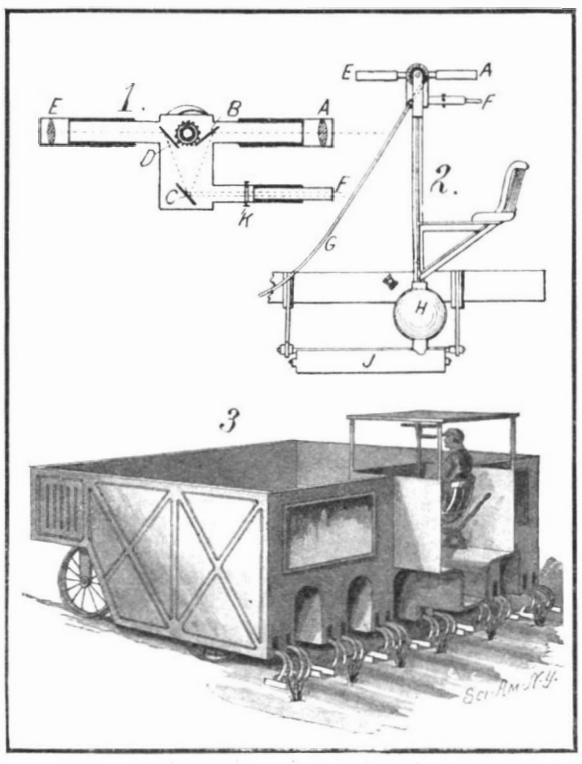
The wire stretcher which is illustrated herewith is adapted for use when stringing fence wires, and is designed to draw the wire taut in advance of the post where its next fastening is to be made, and thus provide ample space for the stapling. The device comprises two parts, one consisting of a beam which is attached to the wire, and the other of a slide on this beam, which is adapted to be secured to the fence-post. In our illustration, the slide is shown attached to the post at *A* by means of a chain. The bar is suspended from the wire at one end by means of a hook, while at the opposite end it carries a clamp *B*, by means of which it is securely fastened to the wire. Attached to a center plate *C* on the slide is a cable, which passes over a pulley *D* carried by the beam. Thence the line passes about a pulley *E* in the slide, over a pulley *F* carried by the beam, and back again to a pulley *G* journaled in the slide. It will be evident that by drawing on this cable, the beam will be forced to slide with respect to the fence post and thereby stretch the wire. In order to multiply the power applied in stretching the wire, a hollow lever is mounted in the slide, and through this lever the cable is passed. By turning the line back over the end of the lever to prevent it from slipping, and then depressing the lever, it is obvious that the line will be drawn forward. A catch *H*, which bears against the cable as shown in the illustration, then prevents the latter from slipping back. Mr. Robert G. Larzelere, of Manhattan, Kans., is the inventor of this improved wire stretcher.



DEVICE FOR STRETCHING WIRE.

NOVEL ATTACHMENT FOR AGRICULTURAL IMPLEMENTS.

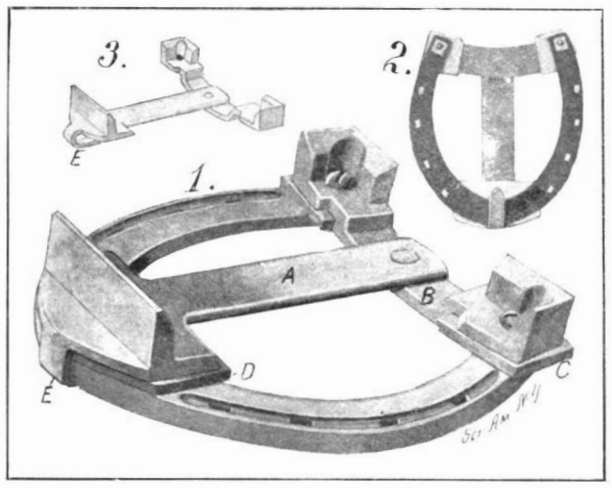
A recent invention provides a decidedly novel attachment adapted to be used in connection with agricultural implements of various kinds, but intended particularly for use with a cultivator of special make. This cultivator is shown in the accompanying engraving, and it will be noted that it is designed to operate on six rows at one time. The cultivator is power-driven, and the novel attachment referred to consists in a device for making the cultivator operate in a straight line. The attachment is illustrated in Fig. 2, and an enlarged section of a portion of the attachment is shown in Fig. 1. The device consists of a telescope or field glass provided with two object glasses, *A* and *E*, and a system of mirrors, *B*, *C*, and *D*, whereby the operator looking into the eye piece *F* may see a sighting post in front of him, and at the same time a post to the rear of him. The sighting telescope is supported on a standard, which also carries the seat for the operator, and it is connected with the cultivator in such manner as to always lie parallel with the axis of the machine. At the base of the standard is a pendulum *J* and a gyroscope *H*, adapted to maintain the telescope in vertical position and keep it steady, so that vibrations of the machine will not disturb the glass. It will be evident that as the cultivator moves from one end of the field to the other, it will be necessary to change the focus to make up for the advance toward one post and a motion away from the other. By means of a flexible shaft *G*, connected with the traction wheels of the cultivator, this change of focus is effected. The shaft turns a worm gear, which gradually feeds the lens *E* outward and the lens *A* inward. The operator is thus relieved of the necessity of adjusting the sighting instrument, and may devote his energies to keeping the cultivator in the right path by operating the necessary steering levers. A patent on this improved sighting device has recently been granted to Mr. William H. Robertson, of 4322 Laclede Avenue, St. Louis, Mo.



SIGHTING DEVICE FOR AGRICULTURAL IMPLEMENTS.

SAFETY PLATE FOR HORSESHOES.

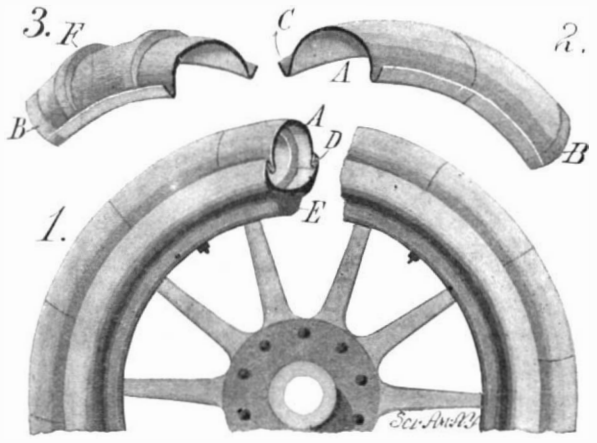
Pictured in the accompanying engraving is a device adapted to be applied to horseshoes to take the wear and thus obviate the necessity of frequently shoeing the horse. The device may easily be detached and replaced with a new one. It consists essentially of a T-shaped plate, which is hooked over the front of the horseshoe, and is fastened at the heel by two small bolts. The plate comprises two members, *A* and *B* respectively, the bar *B* extending across the heel of the shoe, and the bar *A* reaching from the bar *B* to the toe of the shoe. The bar *A* is formed with a heavy toe calk, and at its forward end is provided with a hook *E*, which is slipped over the toe of the shoe, fitting into a recess formed in the horseshoe. Between the toe calk and the shoe a leather or rubber pad *D* is placed. The bar *B* is provided at each end with a heavy calk of angle form. Bolts seated in the bar within these angles extend through holes in the horseshoe, and are adapted to receive a pair of flat nuts. Between the heel calks and the shoe, a pair of leather or rubber pads *C* are provided. The advantages claimed for this horseshoe plate are that it may be readily taken off by unscrewing the nuts and be replaced with a new plate, that it prevents many unnecessary and harmful nailholes in the hoof, and that, as the plates practically take up all the wear from the roads, a well-fitting set of horseshoes will last for several years. The rubber pads will cushion the shoes and afford comfort to the horse when traveling on hard-paved streets. The inventor of this horseshoe plate is Dr. G. Emil Dargatz, of 500 Bennington Avenue, Kansas City, Mo.



SAFETY PLATE FOR HORSESHOES.

COVERING FOR AUTOMOBILE TIRES.

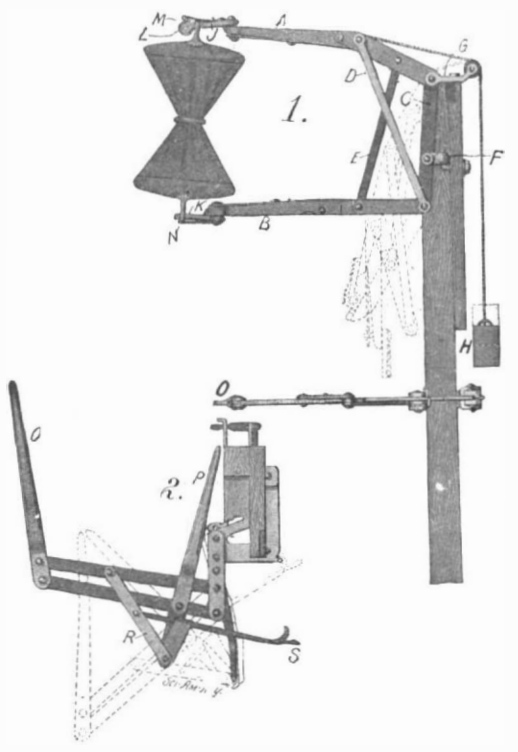
With the purpose of protecting automobile tires from puncture or excessive wear, a recent invention provides a metal covering which may be readily set in place. The covering consists of a series of sections which are fitted together in such manner as to allow of a certain amount of elasticity. The details of this covering, and the method of applying them to the wheel, are clearly illustrated in the accompanying engraving. The covering sections are shown at *A*. Each section is formed at one end with a reduced portion *B*, adapted to fit snugly within the adjacent covering section. The coverings are semicircular in cross section, and are provided along each edge with an upturned flange *C*. A special form of rim *E* is provided, which has hooked edges *D* adapted to fit over the edges *C* of the coverings. While the covering sections are preferably made with a smooth surface, they may also be formed with ribs *F*, to adapt them for use on slippery or muddy roads. In applying the covering sections, the automobile tire is deflated, and the sections are squeezed together to permit of slipping the flanges *C* under the hooks *D*. A patent on this improved covering for automobile tires has been granted to Mr. Joseph Tilden, of Searchlight, Nevada.



COVERING FOR AUTOMOBILE TIRES.

MAIL DELIVERER AND RECEIVER.

The mail deliverer here illustrated is so arranged that it will collapse unless held open by the mail pouch, and will automatically close in a substantially vertical plane as the bag is removed, thus carrying the mechanism out of the danger zone. The receiving mechanism is designed to grasp the pouch without undue shock, and swing to inoperative position under the force of impact. The mechanism is reversible, so that the pouch may be caught from either direction. The delivering mechanism comprises a pair of arms *A* and *B*, connected by a link *C* at their inner ends, and at points therebeyond by links *D* and *E*. The link *C* is hinged to the supporting post at *F* and also at *G*. A line attached to the arm *A* carries a counterweight *H*, which serves to break the fall of the frame when the latter collapses. The arm *B* is made up of two members, both of which are pivoted to the link *E*. One of the members, namely, the one shown in the foreground, is jointed, and is connected to the lower end of the link *D*, but not to link *C*. The other member serves as a stop to hold the jointed member in alignment when the arm *B* is raised to horizontal position, and this stop member is connected at its inner end to the link *C*, but not to link *D*. Owing to this arrangement, when the two arms are not connected by means of the mail pouch, the frame will collapse to the position indicated by dotted lines. The mail pouch is held to the arms *A* and *B* by means of fingers *J* and *K* respectively. These fingers are pivoted on vertical pins, so as to permit the pouch to swing laterally in the direction in which the mail car is moving. The finger *J* carries a roller *L*, and a catch *M* is pressed against the roller by means of a spring. Between the spring and the roller the upper handle of the mail pouch is held. At the lower end the mail pouch is held between a spring *N* and the finger *K*. When the mail pouch is caught by the receiving mechanism on the mail car, the entire frame, owing to its pivotal connection with the post, will swing laterally to a limited extent, and thus cushion



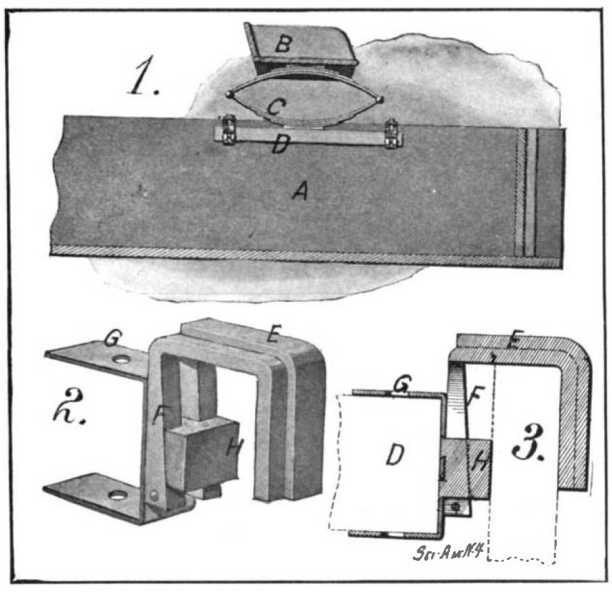
MAIL DELIVERER AND RECEIVER.

the shock. Below the delivering mechanism is the receiving mechanism, which is best shown in the plan view. This comprises a pair of arms *O* and *P*, which are connected to a bracket carried by the post by means of a pair of substantially parallel bars. The arm *O* is hinged to both of these bars, while the arm *P* is hinged only to the outer one. However, a link *R* connects the inner bar with an extension of the arm *P*.

In operation, when a pouch is received by the mechanism, the impact is sufficient to collapse the frame to the position shown by dotted lines, while an arm *S*, connected with the link *R* and having a hooked outer end, engages a projection on the supporting bracket, and thus prevents the arms *O* and *P* from separating. The impact will be sufficient to swing the entire mechanism around to the rear of the post out of the danger zone. The bracket supporting this receiving mechanism is so designed as to permit of reversing the position of the mechanism, so that it will receive a mail pouch from a train coming in the opposite direction. While our illustrations show the deliverer and receiver attached to a post, it will be evident that the same mechanism could be applied to a mail car for receiving and delivering mail pouches. The inventor of this mail deliverer and receiver is Dr. Oliver Fisher, of Sloan, Iowa.

LOCK FOR VEHICLE SEATS.

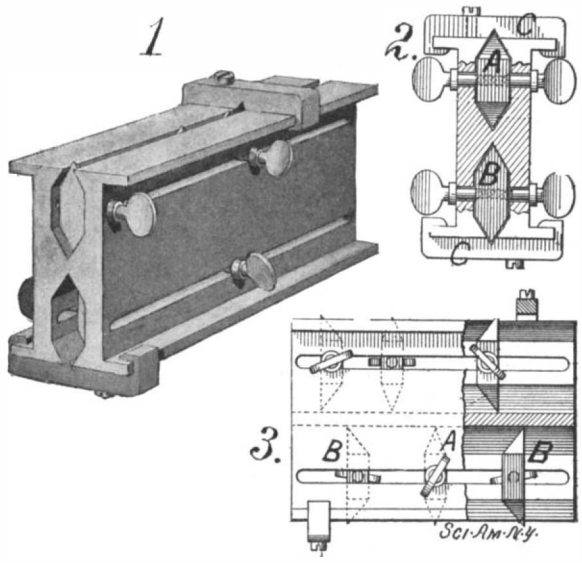
The accompanying illustration shows an improved device for holding the seats of a vehicle in place, so that they will not slip forward or backward, or jump out of place when the vehicle is traveling over rough roads. The lock is a very simple one, which may be instantly disconnected from the vehicle body by simply lifting the seat. In our illustration the vehicle body is indicated at *A*, while at *B* is a seat supported on springs *C*, carried by the bars *D*, the latter being held in place by the improved locking devices. These consist of brackets *E*, adapted to hook over the side boards of the vehicle body. The brackets are U-shaped, and are provided with a slotted inner leg, which is formed with a tapered surface *F*. The bars *D*, which carry the springs *C*, are secured in brackets *G*. A button *H* projects from the bracket *G* through the slot in the bracket *E*, and the head of the button bears against the tapered surfaces *F*. It will be evident that when a weight is placed on the seat *B*, the button *H* will slide down the tapered legs *F*, and will be thereby forced against the inner face of the side boards of the vehicle body *A*. Thus the side boards will be clamped between the button *H* and the outer leg of the bracket *E*, and the vehicle seat will be held in place. Two of these clamping devices only need be employed in connection with a seat, but preferably four are used, one at each end of each supporting bar *D*. A patent on this seat-lock has recently been secured by Mr. John Arcoren, of Rosebud Agency, S. D.



LOCK FOR VEHICLE SEATS.

AN IMPROVED MARKING GAGE.

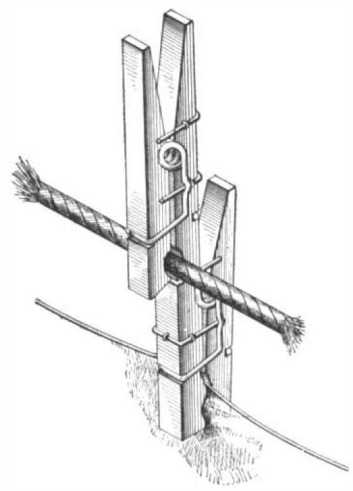
The marking gage illustrated in the accompanying engraving is especially designed for the use of carpenters, joiners, and cabinetmakers, to permit of conveniently and accurately laying out mortises and the like. The device is of very simple construction, and it may be easily adjusted according to the nature of the work in hand. In the stock or body of the gage two longitudinally-extending recesses are formed, which reach from one end of the stock to the other. A slot connects each recess with the adjacent face of the stock, and the recesses are also connected by slots with the sides of the stock. Fitted into these recesses or guideways are a number of markers, *A* and *B*, which may be freely adjusted to any position therein, with their cutting points projecting through the slots in the opposite faces of the stock. Passing through the slots in the sides of the stock are a series of thumb screws, one for each marker. The screws are threaded into the markers, and serve to clamp the latter at the designed position within the stock. Each face of the stock is provided with flanges, forming guideways for abutment bars *C* to slide on. These abutment bars extend transversely across the stock face, and may be secured in any adjusted position by means of set screws. It will be evident that the markers may be set independently one of the other, according to the work in hand; that is, the set of markers in one guideway may be set to mark vertical lines for a mortise, while the markers in the other guideway may be set to give the width of the mortise. The markers are double pointed, so that when one point becomes dull the other may be brought into operative position. In order to allow close adjustment of adjacent markers, the clamping screws of these markers extend in opposite directions, as indicated in the illustration. Mr. Abraham Solomon, of 113 West 120th Street, New York, has recently secured a patent on this improved marking gage.



AN IMPROVED MARKING GAGE.

ODDITIES IN INVENTION.

A Novel Clothes-Pin.—The object of the invention shown in the accompanying illustration is to provide a clothes-pin which will support the clothes without the necessity of engaging them with the line, and thus prevent them from freezing fast to the line in cold weather. It will be observed that the improved clothes-pin consists in reality of two clothes-pins, one of which is adapted to grip the line, and the other, the clothes. In winter weather it will be found an advantage to attach the clothes-pins to the clothes before taking them out of the house, after which they may be quickly and easily engaged with the clothes-line.

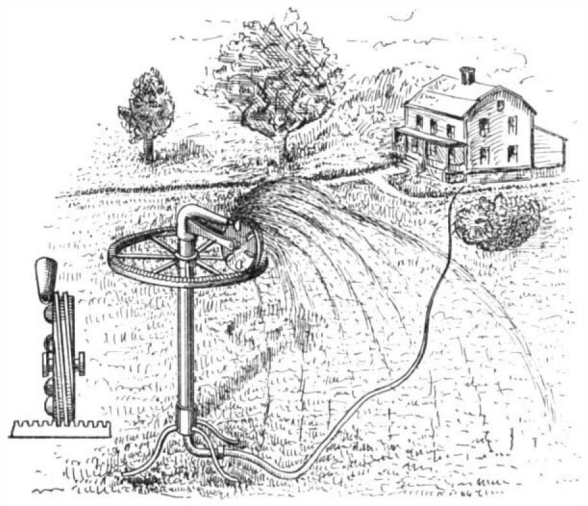


A NOVEL CLOTHES-PIN.

Ankle Support for Skates.—A useful attachment has recently been invented, which may readily be secured to skates and operates to support the ankle of the skater. Persons with weak ankles cannot depend upon the shoe alone, to support their ankles when skating, and the usual straps are hardly sufficient for this purpose, as they do not furnish any support above the ankle. The support here illustrated is designed to meet the requirements of the weak ankle, by providing a support which extends above the shoe-top, and terminates in a band adapted to be securely strapped to the leg. This support is fastened to the skate heel-plate by means of screws or rivets.

ANKLE SUPPORT FOR SKATES.

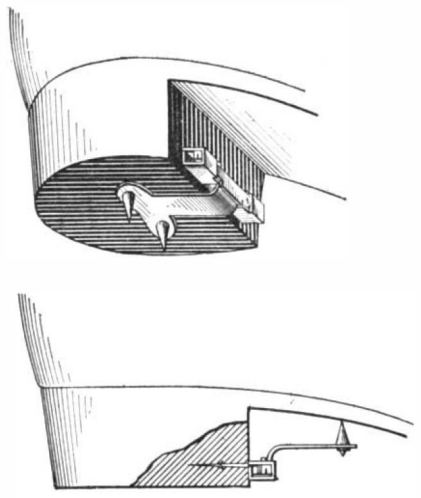
Lawn Sprinkler.—A novelty in lawn sprinklers has recently been invented by a man living in Oregon. The device consists of a central tube supported on a standard to which a fixed gear ring is attached. Swiveled at the top of this tube is a nozzle formed with a bracket which carries a paddlewheel. The paddle wheel is provided with a peripheral worm thread adapted to engage the teeth of the gear ring.



A PECULIAR TYPE OF LAWN SPRINKLER.

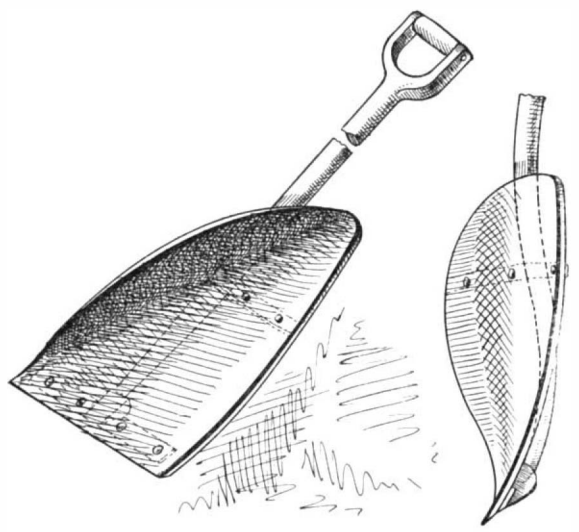
In operation the tube is connected with the water supply, and the water flowing out of the nozzle is directed against the vanes of the wheel, causing the latter to rotate and feed itself with the nozzle around on the gear ring. The water striking the vanes is spread as a shower over the lawn, and as the nozzle revolves a large area is covered.

Ice Creeper.—In the accompanying engraving we illustrate an ice creeper, which may readily be attached to the heel of a shoe to prevent one from slipping on the ice. The device is so designed that it may be swung out of the way whenever desired. It consists of two sections, namely, a heel section and a spur section. The heel section may be made fast to the inner side of the heel by driving therein a barbed anchor-bar. The spur section is hinged to the heel section, and by means of a flat spring, may be held either in a folded position, when the spurs bear against the sole of the shoe, or in the operative position, when the spurs project from under the heel, as indicated in the cut.



ICE CREEPER.

Snow Shovel.—A snow shovel of simple design is herewith illustrated, which operates somewhat on the principle of a snow plow, so that the snow may be readily removed from the walk and thrown to one side in a continuous operation, while moving the shovel forward over the surface. The blade of the shovel is of such shape that it will pick up the snow and deliver it to one side. In practice, as the shovel advances over the ground surface, it is liable to come in contact with obstructions, and in order to enable it to readily override such obstructions, the inventor has provided at the rear of the shovel blade a series of lugs, so that by rocking the shovel handle downward, the cutting edge of the blade will be lifted sufficiently to clear the obstacle.



SNOW SHOVEL.

RECENTLY PATENTED INVENTIONS.

Pertaining to Apparel.

WAIST SUPPORTER AND FORMER.—ELIZABETH DILWORTH, Baltimore, Md. The invention relates to improvements in waist supporters and formers, and has for its object to provide a cheap and efficient device for use in holding down the waist and particularly for giving the pointed effect of the "straight front" so much in vogue at present, to the front of the waist, and to also provide a device which may be used at the back of the waist as a girdle pin.

TROUSERS-EXPANDER. — J. SARGH, New York, N. Y. This invention relates to wearing apparel and its object is to provide a new and improved expander, designed for holding the trousers expanded at the inner sides of the legs of the wearer to hide the bow-legged formation of the legs of the wearer.

INSTEP-SUPPORT.—F. N. MCKINNON, Boston, Mass. In this instance the invention has reference to improvements in devices designed to be placed in shoes or boots, with an object to secure a practically rigid support for the arch of the wearer's foot and yet permit of sufficient yielding or spring.

Electrical Devices.

BURGLAR-ALARM.—C. VAN BERGH, Winnipeg, Manitoba, Canada. More particularly the invention relates to means whereby an electric bell and a talking machine may be started in operation, to work alternately and in succession to give the alarm upon the closing of the circuit by the intrusion of a burglar. The circuit after having been once closed is prevented from being broken again, save by one familiar with the construction.

PARTY-LINE TELEPHONE SYSTEM.—N. S. PAGE, New York, N. Y. The invention provides a line with a relay member so arranged that when the latter is energized it performs a double office. It allows any telephone on a line to be connected up ready for ringing and talking, provided no other on the same line is already in use. It operates to complete the bell circuit so that the bell may ring to announce the incoming call. Both operations have been accomplished by means of separate relays, but Mr. Page combines the two in the work of a single relay.

Of Interest to Farmers.

HOEING-MACHINE.—W. A. HARRIS, Greenville, S. C. The invention is an improvement in hoeing machines specially designed for chopping cotton, and has for an object to provide a novel construction of machine in which the several parts are capable of operation and adjustment in such manner as to effectually hoe the cotton, and with results in chopping much superior to those commonly secured.

Of General Interest.

TRUSS.—G. Q. SEAMAN, New York, N. Y. This truss is such as worn by persons suffering from hernia. The object of the inventor is to produce a device which can be readily applied to the body and securely retained in its proper position, the arrangement being such that the pressure of the pad at the point of rupture may be controlled or adjusted.

DISPLAY-CABINET.—T. C. HUTCHESON and A. M. WILKINS, Comer, Ga. The object of the improvement is to provide a cabinet for displaying, holding and protecting laces and other fine goods of like character, in such a manner as to conveniently exhibit them and retail any quantity of the same without soiling and which when not in service may be closed up tight so as to be perfectly protected against dust, etc.

SWING-SHELF.—F. W. HUNT, Key West, Fla. The aim in this case is to provide a shelf or bracket for supporting a typewriting machine, books or other articles, and more especially designed for use on an office desk or similar piece, the arrangement being such that the user when seated can readily move the shelf into convenient position for making use of the typewriting machine, book or the like, and for swinging the shelf to one side of desk, to leave the front wholly unobstructed.

ORGAN-PIPE.—A. GOTTFRIED, Erie, Pa. This organ pipe is arranged to respond quickly and positively to the sheet of wind, and to allow of obtaining different tonal qualities in a simple manner. The pipe can be readily made in any pitch or foot number, 16, 8, 4, 2 and 1 foot, with equally good results. The body of the pipe may be put together either in one or more sections and all such parts may be made of different metals and of different thicknesses.

PAPER BARREL.—E. P. EVERETT, New York, N. Y. In giving a paper barrel the usual oval form, incisions are placed directly opposite each other, which weakens the paper on these lines and often causing it to tear when dampened with an adhesive substance during the winding operation. The inventor overcomes this objection by forming the incisions in opposite edges of the strip in staggered relation. A novel form of head is readily applied and removed.

PEN HOLDING AND RELEASING DEVICE.—J. O. DODGE and E. E. DODGE, Los Angeles, Cal. In the present patent the invention has for its object the production of an improved pen holder in which the pen can be quickly removed from the holder when desired without soiling the fingers, as is common to the ordinary pen holder.

NON-REFILLABLE BOTTLE.—P. DWYER and J. OTTMAN, New York, N. Y. The bottle is first filled and a tube with its binding is inserted in the neck and sealed therein. Inverted, the liquid therein passes through the flaring mouth of the tube and past the first valve into the central section of the tube, thereby lifting the second valve from its seat and permitting liquid to pass around a bend and through the outer section of the tube. If the bottle is arranged in an upright position, the liquid cannot be passed into it through the end of the tube as the last-mentioned valve is then closed on its seat.

DENTAL FLOSS.—J. D. CUTTER, New York, N. Y. The object of the inventor is to construct the floss in the form of a ribbon instead of giving it the accustomed twisted shape, thus enabling the improved floss to be more conveniently entered between the teeth, and to enter narrower crevices than twisted floss; and also in operation it covers a greater amount of surface.

IRRIGATING-PIPE.—W. CONNOLLY, Fort Benton, Mont. The purpose here is to so construct the end portion of the water supply pipe that is passed through the levee of an irrigating ditch or canal that the receiving end of the pipe may be closed or opened at will, and so that the amount passing through can be regulated to meet existing conditions. The pipe will not be dislodged from its position by pressure of water in the supply basin that it enters.

BANJO ATTACHMENT.—E. J. BABBITT, Petoskey, Mich. Generally speaking, the invention relates to banjos, and specifically to an attachment whereby additional strings may be employed on the banjo, adapting the instrument to greater range in the combination of harmony, than possible with the ordinary, or five-string banjo.

JOINING DEVICE.—H. POHLMANN, New York, N. Y. The object of the invention is to provide a joining device for securely and firmly holding wooden parts together, such as the wrest plank and back frame of a piano, to provide for the strain exerted on the wrest plank by the strings. The device is made of a single piece of metal.

SAW.—S. J. GRAY and J. HORNING, Oakland, Cal. The saw consists of a series of alined links, each link comprising a plurality of parallel plates. The links may be easily connected and disconnected and they are firmly supported against the work by the peculiar arrangement of the tie bar connecting said links. The filling plates are preferably secured to one plate, as by brazing or by rivets.

GUN-SIGHT.—G. H. GARRISON, Olympia, Wash., and W. A. HILLIS, Portland, Ore. The sight is particularly useful in connection with single-barreled shot guns. An object of the invention is to provide a durable sight which may be securely removably mounted upon a gun barrel, and which provides a sighting groove to be used in connection with the foresight of the gun.

WEIGHING AND MEASURING DEVICE.—A. E. ABBOTT, Twin Falls, Idaho. This invention has reference to improvements in devices for dispensing materials in desired quantities. When the device is held free by means of its handle, and material is placed in the receptacle, the latter will be moved downward relatively to the handle, and this moves the pointer to indicate the amount of material in the receptacle.

STOVEPIPE-JOINT.—H. S. BLOOD, Bottineau, N. D. In this invention the key forms a connection between the pipe sections throughout their circumference, and by thus securing the continuous locking between the parts, avoids any danger of disconnection or breakage of the sections from unusual strain in any direction. Mr. Blood has obtained another patent on a stovepipe joint. Its pipe sections are telescoped together and a key is introduced into a flap when opened. After introduction to lock the sections the latter may be turned rotatively relatively to each other to the proper position, thus tightening the sections by a screw action.

AUTOMATIC FIRE-EXTINGUISHER. — W. G. ASMUS, Cleveland, Ohio. The invention relates more especially to automatic sprinklers for fire extinguishing apparatus adapted for use in factories, warehouses, car storage-houses, car-yards, and other buildings, in connection with the water supply thereof, and acting under the abnormal increase of temperature to distribute water, preferably in a spray, in the surrounding space.

MOUSE-TRAP.—J. A. VINCENT, Hastings-upon-Hudson, N. Y. Mice attempting to reach the bait from an auxiliary chamber are attracted to the upper portion of the bait chamber where the bait is attached to a hook at the rear end of the entrance chamber. They move along a trap-door, and passing beyond the hinge-pin the inner end of the door drops and they are dumped into the water receptacle. The door resumes its position, the outer end of the door being weighted to balance the trap-door evenly. The contents of the receptacle may be emptied, by removing the detachable cover, and the receptacle refilled.

Hardware.

NUT-LOCK.—J. W. CHAPMAN and C. C. Foss, Barwick, Ga. The improvement permits the nut to be turned home, will hold the nut securely and can be released when desired to permit the nut to be turned off the bolt without any injury to the bolt; also the invention can be used on ordinary bolts involving no change in the structure of the bolt and the bolt will not be injured in the use of the invention.

SNAP HOOK OR LINK.—J. W. GONCE, Chattanooga, Tenn. The more particular object in this instance is to produce a hook in which the principal member is made of a single piece of spring wire, and in which the separable link or other member is easily connected with or disconnected therefrom at will, and yet retains a firm connection when in actual working service. Hooks may be connected together to form a chain, any member of which may be detached.

STRAP-LOCK.—R. VERCH, Albany, N. Y. The lock is adapted for attachment to one end of a strap, also to receive the opposite end of the strap to hold it in locked position so that it cannot be released for attachment unless a key is applied to the tumblers forming a portion of the lock, or a latch is moved that is connected with the tumblers, the lock being employed preferably as an auxiliary to a buckle or other means for fastening straps.

PIPE-WRENCH.—J. L. BROWN, Brookville, Pa. In the present patent the invention is an improvement in pipe wrenches in which a chain is employed as the gripping member, the same being pivotally connected with the end of a lever and the latter provided with means for locking the free end of the chain after being passed around the pipe or other object.

Heating and Lighting.

FURNACE-GRATE.—M. WASHBURN, Ossining, and R. D. GRANGER, New York, N. Y. The intention in this case is to provide a construction comprising a plurality of grate sections, each carrying a plurality of pivotally supported grate bars, and an operating means for swinging the grate sections and grate bars on their individual pivots as desired.

AIR-HEATER.—A. H. LOVEJOY, Red Bank, N. J. This heater is for use in buildings, and the object of the inventor is to provide a heater made in sections each of which is practically a complete heater in itself, thus permitting of conveniently setting up any desired number of sections one alongside the other, according to the heating capacity required of the heater.

Household Utilities.

ADJUSTABLE BAKE-PAN.—J. MIO, Salt Lake City, Utah. This pan is to be used for baking bread, cakes, or the like, details of which pan permitting it to be adjusted longitudinally for changing its length, and thus adapt the pan to receive loaves having different lengths; the pan being also available for baking or roasting meat or poultry of varying dimensions.

ANIMAL-TRAP.—A. T. SULLIVAN, Malcolm, Neb. The purpose of the invention is to improve upon the construction of the animal trap for which Letters Patent were formerly granted to Mr. Sullivan, to such an extent that it will be simplified and rendered more economical in general construction, more sensitive when set, and more flexible and positive in action when tripped.

VEGETABLE-SLICER.—R. C. EZEKIEL, Carbon Hill, Ala. The principal feature of the invention is the arrangement of the cutters for adjustment to cause them to cut slices of varying thickness. It is an improvement on that class of slicers in which the vegetable is reciprocated over the cutter or cutters fixed in a suitable base or support.

WINDOW-SCREEN.—F. J. BOEHL, Spokane, Wash. The inventor improves on the window-screens which are formed of woven wire or wire gauze attached to wooden frames, the construction and arrangement being such that side openings are provided through which flies and other insects may freely escape from a room or an apartment, but are prevented from returning.

Machines and Mechanical Devices.

TUBE-CUTTER.—J. G. LUSK, Newcastle, New South Wales, Australia. The object here is to provide a tube cutter more especially designed for cutting the ends of defective boiler tubes in a very simple, quick and effective manner. In operation a gradual outward feeding of the disk cutter takes place, while the cutter is bodily carried around with the casing, and insuring quick and accurate cutting of the boiler tube.

DRAFT-EQUALIZER.—A. LANGE, Scribner, Neb. The intention in this instance is to produce a mechanism which will enable two, three or four animals to be hitched, at the same time operating to divide the work substantially equally between them, while preventing side-draft upon the pole. It relates to equalizers such as used in connecting a plurality of draft animals to a vehicle or agricultural implement.

ROCK-DRILL.—E. N. JONES, Victor, Col. The object in this case is to provide a new and improved rock drill, which is simple and durable in construction, very effective in operation, and arranged to automatically turn the drilling tool previous to the blow being struck by the hammer piston on the drilling tool.

DRILL-CHUCK.—G. A. ORR, Cripple Creek, Col. The invention constitutes an improvement on the chuck formerly patented by Mr. Orr, and relates especially to drill chucks employed in miners' drills. The object is to produce a chuck which will be of few parts but which can be quickly applied and will operate to hold the bit securely.

BAND-SAW-WHEEL GRINDER. — D. C. CRIVYEA, Aberdeen, Wash. The wheels of the pulley on which band or endless saws run, become worn and acquire an uneven surface, which requires to be reground in order to reproduce a perfectly true face or periphery. This is usually effected by a machine operated by a separate motor. Mr. Crivyea has devised one which is adapted to be driven by a belt applied to the band-saw wheels or pulleys themselves.

VAULT-CLOSURE.—F. UNCKRICH, Galion, Ohio. The object of the invention is to provide a vault closure by means of which the vault opening can be securely locked from the outside and which effects a hermetical sealing of the vault opening. It is particularly useful in connection with devices intended for locking and hermetically sealing grave vaults.

CASH-REGISTER.—R. T. PISCICELLI, 22 Piazza della Borsa, Naples, Italy. The invention refers to a machine which shall register the money received in various departments of a shop, stores or the like, and shall be reliable and easily controlled. It is capable of performing seven of the most important operations. It registers sales up to $99.99 each in units of decimal money, and may be modified for pounds, shillings, and pence or other money.

CURTAIN-DISPLAY RACK.—H. R. NELSON, New York, N. Y. The curtain may be reversed by inverting a movable carrier and permitting the device on the curtain to be seen from either side. Means support a display curtain or rack in the carrier and locate a handle on the casing for manipulating it, and means are provided whereby the difference in the amount of curtain taken up by the rollers of machines of this character as the curtain is wound upon them will be compensated by the position of the names of stations or advertising devices on the curtain.

FEATHER-DRYING MACHINE.—E. EISEMANN, New York, N. Y. This machine will speedily dry feathers after they have been washed and at the same time remove any surplus starch or other like material with which they might be coated. It is accomplished without injury to the feathers. More especially the design is for drying ostrich and other ornamental feathers preparatory to placing them on the market.

BEER-RACKER.—I. LOWY and O. F. ADELMAN, Chicago, Ill. The tank being filled with beer from the cooler, the barrel to be filled is placed beneath the tank. Means provide for turning a shaft and lowering the rack connected with the filling pipe. A seal carrying frame and the pipe descend with their own weight until the seal is in contact with the bung hole. Means permit the beer to flow from the tank to filling pipe, the displaced air from the barrel passing to the upper part of tank to take the place of the tank displaced air. The barrel filled, means elevate the pipe until the flange on the lower edge engages the beveled end of the ring, when final means elevate the frame out of contact with the barrel.

Prime Movers and Their Accessories.

WATER-TURBINE.—F. MATTAUSCH and W. T. MATTAUSCH, Lincoln, and J. F. SCHLOSSSTEIN, Cochrane, Wis. The invention pertains to a water turbine intended particularly to operate around a vertical axis, although it may be arranged with its axis of rotation horizontal, if desired. It may be operated either above or under the water, and horizontally or vertically. In the horizontal position of the wheel better advantage is taken of the head of water.

TURBINE AIR-COMPRESSOR.—E. C. POLLARD, Seattle, Wash. The purpose here is to provide a turbine or rotary air compressor which will develop moderately high pressure at practicable speeds and in so doing will draw air from the atmosphere by the use of the "trompe" principle, and compress it by centrifugal force of a revolving mass of water, which being some eight hundred times heavier than air will produce a proportionately greater degree of compression than a centrifugal blower wherein air alone is used.

MULTIPLE-PISTON INTERNAL-COMBUSTION ENGINE.—C. E. VAN AUKEN, Yonkers, N. Y. A special intention in this instance is to improve the port arrangement so that the engine is rendered valveless and the charge may be admitted simultaneously to the two crank cases respectively at the ends of the cylinder, in which cases the charge is compressed and thence transferred through a small inlet port to the cylinder.

INTERNAL-COMBUSTION ENGINE.—H. S. ANDERSON, Pittsburg, Pa. The object of the inventor is to provide a construction wherein the air delivered to the carbureter is heated by radiation and a richer mixture thus produced in the carbureter, and this mixture is also heated by radiation from the engine cylinder before being ignited within the cylinder.

SIGHT-FEED LUBRICATOR.—N. MCCOY, Marshalltown, Iowa. The lubricator is for use particularly in connection with steam engines. The object of the invention is to provide a

device in which the pump is utilized to force the lubricant through a transparent tube into the steam pipe or other part of the engine so that the manner in which the lubricant is being fed may be observed by the attendant.

MOTOR.—J. SCHROEDER, Davenport, Iowa. Among the objects of this invention is the provision of a motor in which the admission and discharge of the motive agent to and from the cylinder at both sides of the piston will be controlled by a single positively-operated valve. It is especially designed as a hydraulic motor but will be found to have high efficiency when actuated by either steam or air.

Railways and Their Accessories.

CAR-STEP.—G. G. COMER, A. BURK, and D. MODROW, Kalama, Wash. The car-step has an extensible step adapted to be operated from the platform of the car. The car-step having the lower step extensible is so arranged that it can be easily moved into the lowered position, and adapted to be automatically returned to normal position when a catch which holds it in lowered position is released by being depressed from the platform by the foot of the operator, or by engagement with a step-cover, such as employed in connection with vestibule cars.

LOG OR LUMBER CAR.—M. M. RUSSELL, Eau Claire, Wis. This improvement pertains to flat cars, and while especially designed for conveying logs or lumber, is equally well adapted for other purposes. Such cars are commonly constructed with bunks extending transversely to the cars, and provided with vertical stakes for holding logs or lumber in position. Difficulties attending this and other methods are overcome and means provided to enable a car to be readily loaded and unloaded from either side with minimum labor.

SPRAYING APPARATUS.—J. V. PEARSE, Owensboro, Ky. The invention is an improvement designed especially for spraying plants upon railway tracks with a liquid adapted to destroy the plants. A car is employed which may in general respects be of ordinary construction and has a bed upon which at its opposite ends the tanks are mounted which hold the liquid.

Pertaining to Recreation.

AMUSEMENT APPARATUS.—W. F. MANGELS and C. N. BREWSTER, New York, N. Y. The object of the invention is to provide an apparatus for use in exhibition grounds, parks, pleasure resorts, and the like, and arranged to provide a very enjoyable and exciting ride for the occupants of a car traveling over the course or circuit of the apparatus. It relates to a device shown and described in Letters Patent of the U. S., formerly granted to Mr. Mangels.

Pertaining to Vehicles.

SAFETY-DEVICE FOR VEHICLES.—M. D. ROSA, New Rochelle, New York. By the means of this device draft animals can be instantly released from the vehicle in case of necessity. In case of emergency the brakes can be set simultaneously with the release of the draft animals from the vehicle. Means provide for the brake lever operating independently of the safety mechanism.

VEHICLE-TOP SUPPORT.—G. LAKE, Memphis, Tenn. The object of the present invention is to provide a support, arranged to yieldingly support a folded vehicle top with a view to relieve the top and body of all undue jar and jostle, thus giving more comfort to the occupants. It relates to buggy top prop attachments such as shown and described in application for Letters Patent of the U. S. formerly granted to Mr. Lake.

STEERING-GEAR.—T. J. FAY, New York, N. Y., and J. M. ELLSWORTH, Bernardsville, N. J. The invention relates to certain improvements in steering gears especially adapted for use upon motor vehicles, and relates more particularly to means for transmitting motion upon the steering wheel to the oscillating arm operatively connected by links to the steering knuckles. It more particularly relates to that type in which the steering column is provided with a worm intermeshing with a worm wheel upon a short shaft or pivot supporting the above arm.

THILL-COUPLING.—J. L. TAYLOR, Dalton, Pa. One purpose here is to provide a coupling wherein by simply lifting and turning one member, the shaft butt may be unobstructedly released from the coupling, and wherein also when a shaft butt is placed in position and said member brought to normal position, a spring immediately brings the member to locking, yet yielding engagement with the butt, holding the butts of the shaft in proper position relative to the axle and permitting them to have free yet noiseless movement.

Designs.

DESIGN FOR A SHINGLE.—J. L. DICKELMAN, Forest, Ohio. The patent is for a design for metal shingles embodying in its features a number of raised or embossed figures in the similitude of shields, the main figure lying below two minor figures, and the latter standing on opposite sides of the central line of the main figure and the edges of the shingle having plain ornamental features.

NOTE.—Copies of any of these patents will be furnished by Munn & Co. for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.

Notes and Queries.

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters or no attention will be paid thereto. This is for our information and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.

Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same.

Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

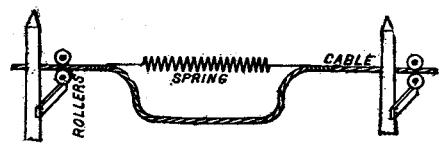
Scientific American Supplements referred to may be had at the office. Price 10 cents each.

Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

(10648) J. E. L. says: I would like to submit a problem for you to settle through your correspondence column. The question is: If a train going at the rate of 100 feet per second, and a man standing on the rear of said train throws a stone also at the rate of 100 feet per second in the opposite direction, what will be the distance between the train and stone in one second? A. The answer is 100 feet. Since the thrower and the stone are being carried forward at the rate of the train, the position of the stone thrown at the end of one second *relatively to the train* will be exactly the same as if the train were at rest. Relatively to the ground, the theoretical path of the stone will be a vertical line, the projectile force given to the stone by the thrower exactly balancing the initial momentum due to the train, and the stone simply dropping to earth at the rate of acceleration due to gravity.

(10649) R. P. R. writes: What would be the difference in the length of a cable, solid wire or in strands, ¼ inch, also 1/6 and 1/8 inch, at a temperature of 100 deg. Fahr. and 40 deg. below zero, in a cable of the above sizes one mile long? Is there any appliance for compensating for the climatic influence in cables so exposed? Or is there any cable that is not subject to change in length from climatic conditions? Which class of cable will be the least affected from changes in temperature—the solid or the stranded cable? A. You do not mention the material of your cable. If iron (or steel—the difference is negligible) its length will increase by 0.000648 per cent for every degree Fahrenheit through which its temperature is raised, or a solid cable measuring one mile at 40 deg. below zero will be longer by 57½ inches at 100 deg. Fahr. This increase in length will be the same for all sizes of wire, their diameters varying proportionately. If the cable is of copper the lineal expansion will be 0.000887 per cent per degree, or a wire one mile long at 40 deg. below zero will be 68½ inches longer at 100 deg. Fahr. We know of no appliance for compensating for expansion and contraction due to variations of temperature. If the cable a mile long is used for some purpose for which its integral continuity is not essential a spring might be inserted, or the ends of a spring might be attached to either side of a bight in a continuous cable, the cable being so carried as to travel freely through its supports and thus compensate at the most convenient point for expansion distributed over its whole length thus:



If the cable is endless and traveling the expansion is best taken up by passing it around a weighted idler pulley. A cable composed of a number of strands is less affected than a solid wire for the reason that each individual wire is helical in form and expansion or contraction in the direction of its length has no direct effect upon the length of the cable.

(10650) W. A. D. asks how to attach an indicator to a Corliss engine. A. If you are accustomed to indicating a slide-valve engine you have nothing to learn in indicating a Corliss except that it is rather simpler, as you have no trouble avoiding your steam-chest with your indicator piping. Drill and tap your cylinder on top for ½-inch pipe with ordinary pipe thread unless steam or exhaust pipes interfere, in which case pipe on the back (side opposite valve rods) in exactly the same way. Be sure (as in any engine) that your holes are drilled into the clearance and never covered by the piston when the engine is on center. Then pipe up with a globe valve on both sides of your indicator, drill and tap your crosshead horizontally at any convenient point in its cheek at right angles to the piston rod, and screw in a stud (say ⅝ inch) long enough to stand out beyond the outside diameter of the cylinder and with enough thread on the outer end for four jam nuts and the thickness of your main lever between them. Attach your lever to floor, or roof or temporary joist, rig your cord in the same way, and proceed exactly as in indicating any other engine.

(10651) C. D. H. writes: Of two traction engines, one of which is 20 horse-power compound and the other 20 horse-power simple, which engine is the stronger with 150 pounds steam pressure? That is, which engine will start the bigger load the quickest? Take the two engines out of the shop and say both are in exact condition; steam both engines up, and without any trials when the pressure of steam arrives at 150 pounds both engines perfectly cold, which engine will take action the quickest? A. It is difficult to give a positive reply to your question which will be true in all cases, as the problem is affected by other considerations concerning the design of the valve gears, besides those you mention. Supposing the compound engine to start practically instantaneously upon the admission of steam to the high-pressure cylinders, the steam of the latter expands into the low-pressure cylinders, of which the pistons are moving, and consequently against no considerable back pressure. The pressure in the low-pressure cylinder would be reduced by condensation in a cold high-pressure cylinder, unless, as is often done, high-pressure steam were admitted directly to the low-pressure cylinder in starting the engine. Supposing, however, that steam is to be admitted only to the high-pressure cylinder of the compound engine, we should say that the simple engine would start the more readily, the same pressure operating on a larger piston area. Given practical conditions the compound engine would develop 20 to 30 per cent more power with the same fuel and water consumption on account of its utilization to a greater degree of the expansion of the steam, i. e., having a greater range of temperature between that of the live steam and that of the exhaust.

(10652) V. A. F. says: I wish to know all about the manufacture of tinplate, especially that which is made by the American manufacturers, and if I can get any information on this subject in any of your papers I wish you would please advise me. Below are a few questions I would like information on, and if you can help me, or advise me how I can get these answers, I would be very thankful to you. What is charcoal iron? What is Bessemer steel? What is open-hearth steel? What is hammered open-hearth steel? The terms 1C, 1X, 2X, etc., indicating the thickness of tin, what do 1C and these terms mean? Where did they originate, etc.? Why does a box of tin contain 112 sheets, such an odd amount? Why not an even 100 sheets, etc.? What is palm oil, used in making tinplate? What is it made of, and do they use a substitute for palm oil? How can I get a list of tinplate mills in the United States? What year was the first tinplate mill opened in the United States? Do American tinplate makers export tin to foreign countries, and to what countries? What is the duty on an ordinary box of tin imported to the United States from England or foreign countries? A. Replying to your inquiry concerning the manufacture of tinplate, we would say that you will be able to secure some information in SUPPLEMENT Nos. 1137, 1019, 1020, 1021, 1022, 1023, 690, which we think will be of value to you. These will be sent at the usual price of 10 cents per copy. Roofing plates are terne plates (steel plates coated with an alloy of tin and lead) are made only in IC and 1X thicknesses (29 and 27 Birmingham gage), "Coke" and "charcoal" tin plates, old names used when iron made with coke and charcoal was used for tinplates, are still used in the trade, although steel plates have been substituted for iron; a coke plate now commonly meaning one made of Bessemer steel, and a charcoal plate one of open-hearth steel. We beg to refer you to the American Tin Plate Co., Chicago, Ill., who, we believe, will be able to give you any desired information on this subject. The thickness and weight of tinplates were formerly designated in the trade, both in the United States and England, by letters such as I.C., D.C., I.X., D.X., etc. A new system was introduced in the United States in 1898 known as the American base-box system. The base-box is a package containing 32,000 square inches of plate. The actual boxes used in the trade contain 60, 120, or 240 sheets, according to the size. The number of square inches in any given box divided by 32,000 will give the "box ratio." This ratio, multiplied by the weight of the base-box, will give the price of the given box. Bessemer steel is made in large converters or crucibles, where the impurities are burned out of the pig by blowing air through the molten metal. All of the impurities, except sulphur, will be oxidized before the iron, so that by stopping the blast at the right moment, and adding a quantity of carbon-bearing material, sufficient carbon may be introduced to produce steel of the proper temper. Open-hearth steel is analogous to the pig-boiling puddling process, the decarburization of the metal being effected by pure oxidized iron ores added to the fused metal in the bath of the furnace. The pig iron, to the extent of five to forty tons, is introduced on the bed of the furnace and melted. After fusion, additions of red hematite, roasted pottery mine, or other pure ores (oxidized) are made from time to time, which effect the oxidation and removal of the silicon, carbon, and manganese in the pig in the same manner as in puddling. At the high temperature attainable in these furnaces, however, the metal remains molten even after decarburization is complete, and its conversion into steel is effected by the addition of spiegel and ferro. Palm oil is obtained from the fleshy covering of the fruit of oil palms, which flourish in West Africa. If there is a substitute on the market, we are unaware of its composition. We are very sorry to say that we have not been able to find the information you desire concerning the year of opening the first tinplate mill, or a complete list of tinplate mills in operation at the present time. We would advise you to write to the Department of Commerce, Washington, D. C., to secure information concerning the export and import of tinplate and the duty attached.

NEW BOOKS, ETC.

ELECTRICITY IN MINING. By Sydney F. Walker. New York: D. Van Nostrand Company. 8vo.; cloth; 385 pages, illustrated. Price, $3.50.

Owing to the fear of interrupting the output of the mines that they were in charge of, mining engineers opposed the use of electrical machinery until its efficiency was proved beyond a doubt. During this stage, the author of this treatise commenced his crusade in favor of electrical installations, and for thirty years has been the apostle of electricity to the mining world, preaching the advantages of electricity for mining, in season and out. In this volume he embodies the results of the experience he has gained during his long practice in his field of activity.

In Chapter I. he gives the usual *résumé*, made as full as possible, of the underlying principles of electricity, with the terms, etc., in general use.

In Chapters II. and III. he has given short descriptions of signals, telephones, and electric lighting apparatus in use about mines.

In Chapter IV. he has gone very fully into the question of the economical generation of electricity.

In Chapter V. he discusses the principles and practice of the distribution of electricity as applied to mining work, giving descriptions of each method of distribution, even though some are not of general application.

In Chapter VI. he deals with the application of electricity to the different machinery about the mine. In writing this chapter he endeavors to reach the increasing number of engineers who are engaged in the application of electricity to mining work, but who are not familiar with the working of mines when they first enter upon their duties.

In Chapter VII. are found a few simple rules for the discovery of faults or causes of failure. This chapter is written to meet the requirements of the man who must locate elusive errors in construction, with the more or less primitive apparatus at his disposal.

THE REPTILE BOOK. Snakes, Lizards, Crocodilions, Turtles, and Tortoises. By Raymond L. Ditmars. New York: Doubleday, Page & Co., 1907. 4to.; 472 pages text; 136 plates. Price, $4 net.

The subject chosen for this addition to the series of "Nature Books" published by this firm is not so popular, perhaps, as some previously dealt with, but in the author's hands it provides much of interest to the general reader, as well as of value to students. As curator of reptiles in the New York Zoological Park he has had exceptional opportunities for obtaining first-hand knowledge; and he has the faculty of imparting his facts in a clear and interesting manner.

Practically all the 254 species of reptiles found in the United States are illustrated, and the descriptions have been written largely with a view to guide in the hasty identification of species. The technical descriptions are supplemented with much popular but trustworthy information; and wherever the novice opens the book, he will find interesting reading. The illustrations, eight pages of which are in color, are entirely satisfactory. Nearly all of them are photographs from life, and they have been excellently reproduced.

HYGROMEDRY. By Henry Emerson Wetherill. Philadelphia: Published by the Author. 12mo.; 82 pp.; illustrated. Price, $2.50.

A description of the author's instruments for measuring the humidity of the body and of its environment. Also descriptions and advertisements of other of his inventions, most of which are designed for the use of the medical profession.

BEHIND THE SCENES WITH THE MEDIUMS. By David P. Abbott. Chicago: The Open Court Publishing Company. London: Kegan Paul & Co., 1907. Cloth; 8vo.; 328 pages. Price, $1.50. net.

The author is an inveterate investigator of the claims of spiritualistic mediums. He professes that he would be only too glad to come across any evidence demonstrating the truth of immortality or of a spirit world, but that he has been unable to discover more than charlatanism. Mediums, according to his pages, are no more than common conjurers, who take base advantage of people's most sacred feelings in order to make a living. Some of them are cleverer than others, and some of them have the assistance of a number of confederates. But all their mysteries may be dupli-

cated by people who neither have, nor claim to have, supernatural assistance. Many of the favorite performances of mediums, such as flower materialization, writing on sealed slates, or spirit voices, are described in detail, and the methods of their working are fully dealt with. The book might almost be regarded as an instruction book; for any amateur or professional conjurer who wishes to add to his stock of tricks may glean some effective ones from its pages.

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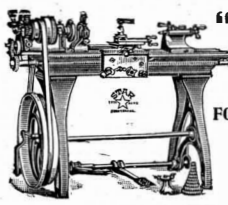

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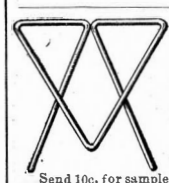

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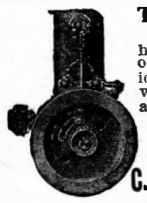

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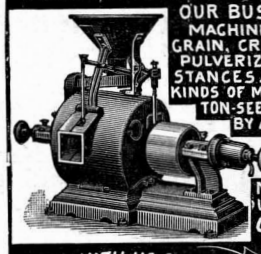

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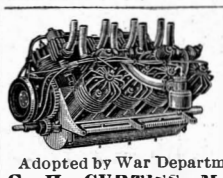

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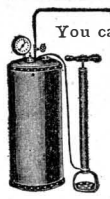

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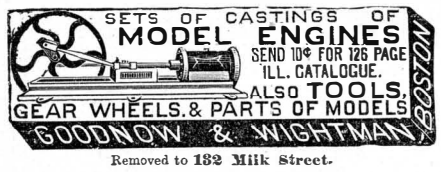

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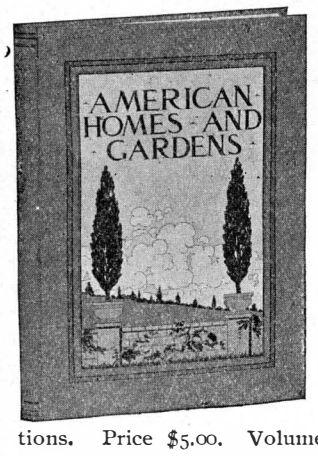

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Hides, skins, and furs, Offene Handelgesellschaft Schroeder Smidt & Co.	66,727
Hosiery, Paramount Knitting Co.	66,702
Insecticides, Leggett & Brother	66,722
Knit stockings, Glidden, Hyde & Co.	66,742
Knitted and netted underclothing, Elmira Knitting Mills	66,706
Knitted garments, certain, M. Halff & Bro.	66,724
Liniment and medicines for catarrh, hay fever, and deafness, Kane Chemical Co.	66,748
Magazine, monthly, System Co.	66,775
Meats and sausages, cured, Kingan & Co.	66,686
Meats, cured, Kingan & Co.	66,701
Meats, cured and salted, Kingan & Co., 66,699,	66,700
Meats, lard and sausages, cured, cooked, canned, and salted, Kingan & Co.	66,687
Medicated and antiseptic pads, F. A. Steele	66,774
Medicinal elixir, aromatic, Hawes Chemical Co.	66,744
Medicinal preparation, certain, Sapa Chemical Co.	66,753
Medicines, certain, Societe "Le Ferment"	66,754
Medicines, certain, Teraqua Mineral Co.	66,776
Metal polishes, abrasive, Armiger Chemical Co.	66,714
Packing, E. C. Garratt	66,762
Paint, gold, Welsh & Jones	66,779
Painters' materials, Patterson Sargent Co.	66,770
Painters' materials, certain, Acme White Lead & Color Works	66,757
Paris green, M. Herrman & Co.	66,719
Pasteboard cases, boxes, and cartons, C. C. Rahn	66,771
Pharmaceutical preparations, certain, H. H. Lepper	66,750
Power transmitting apparatus, clutches, etc., International Patent Corporation	66,720
Preserving and disinfecting agents, Montana Gesellschaft mit beschrankter Haftung	66,726
Razor hones, Sunset Hone Co.	66,730
Refrigerators, Lockland Lumber Co.	66,723
Remedies and tonics, certain, Berg Medicine Co.	66,738
Remedy for certain diseases, Hampden Manufacturing Co.	66,743
Salve, P. W. Leach & Co.	66,751
Sardines, E. Shivell	66,691
Scouring powder, non-abrasive, Azie Manufacturing Co.	66,704
Sewing machine needles, Standard Sewing Machine Co.	66,729
Sewing machines and attachments, Standard Sewing Machine Co.	66,728
Skates, ice and roller, Samuel Winslow Skate Manufacturing Co.	66,711
Soap, toilet and laundry, A. Hons	66,709
Statuary, Daprato Statuary Co.	66,705
Stockings, knitted, netted and lace underwear and waists, Mona Manufacturing Co.	66,725
Stoves, heaters, and ovens, certain, American Stove Co.	66,758
Stoves, ranges, and heaters and coal ranges, gas, American Stove Co. 66,759,	66,760
Stoves, ranges, and parts thereof, Smith & Anthony Co.	66,772
Tonic, H. & H. E. Law	66,749
Turpentine substitute, Southern Substitute Turpentine Co.	66,773
Varnishes, fillers, and colors, Moore Paint Co.	66,768
Watch bows and watch pendants, Wachter Manufacturing Co.	66,712
Watches, Fabrique d'horlogerie Beau-Site Vve Ferdinand Bourquin	66,707
Waters, mineral, S. Harmsworth	66,718
Whisky, Geo. Benz & Sons	66,741
Whisky, J. J. Hermann	66,745
Whisky, I. L. Lamm Co.	66,746
Whisky, W. A. Ross & Bro.	66,756
Whisky, gin, brandy, cordials, and cocktails, W. P. Strader	66,755

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"Bunte," for chocolate and cocoa, Bunte Brothers	13,948
"Collegian," for shoes for men, E. B. Piekenbrock & Sons	13,953
"Farrell's Pride of Colorado Fancy Table Syrup," for table syrup, Farrell & Co.	13,950
"Farrell's Wedding Breakfast Cane and Maple Sugar Syrup," for cane and maple sugar syrup, Farrell & Co.	13,949
"Gossip Chop," for tea, Upham Brothers	13,947
"Kremlin Russian Cigarettes Manufactured by Vladimir F. Gnesin, 'The Russian Store,'" for cigarettes, V. F. Gnesin	13,945
"La Imperiale Bonquet," for cigars, McLean Cigar Manufacturing Co.	13,944
"Monty Krysto," for a preparation for the hair, J. Montague	13,952
"Old German Lager," for beer, Wilmanns Bros. Co.	13,946
"Zerolene," for oils, Standard Oil Co.	13,951

PRINTS.

"Bear Design," for breakfast food, Cream of Wheat Co.	2,181
"Boy Whispering to Sister," for a breakfast food, Cream of Wheat Co.	2,186
"Cute Kids," for a breakfast food, Cream of Wheat Co.	2,185
"Raised on Cream of Wheat," for a breakfast food, Cream of Wheat Co.	2,184
"The Japillusion," for a remedy for diseases of the eyes, The Eye-Fix Remedy Co.	2,187
"The Newsboy," for a breakfast food, Cream of Wheat Co.	2,182
"There is More Cream of Wheat," for a breakfast food, Cream of Wheat Co.	2,183

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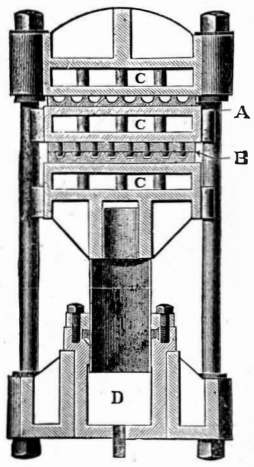

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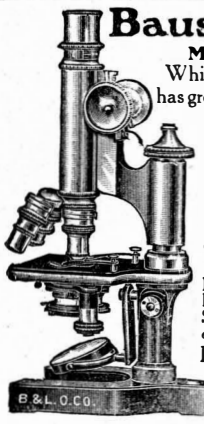

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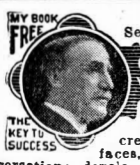

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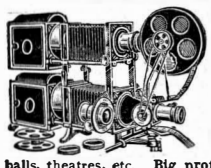

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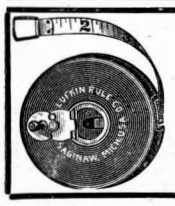

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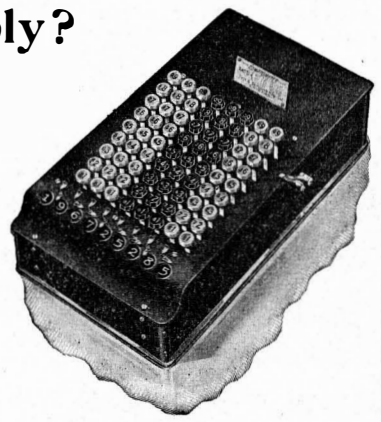

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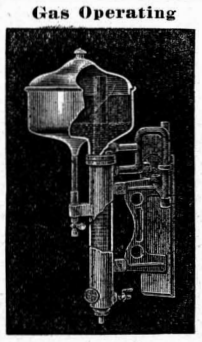

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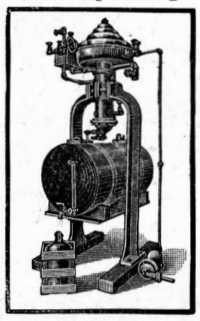

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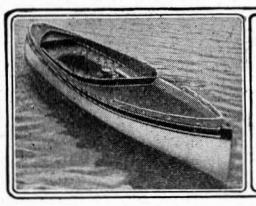

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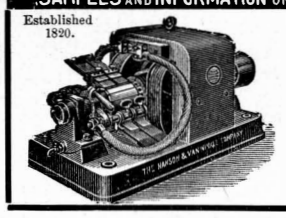

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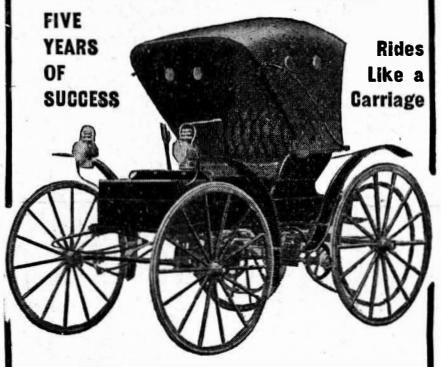

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